An Evaluation

of the Third Edition of the

University of Chicago School Mathematics Project

Transition Mathematics

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Funding for the research in this report was provided by the University of Chicago School Mathematics Project under the guidance of Zalman Usiskin, Director.

Cite as:

Thompson, D. R., Senk, S. L., & Yu, Y. (2012). *An evaluation of the Third Edition of the University of Chicago School Mathematics Project: Transition Mathematics*. Chicago, IL: University of Chicago School Mathematics Project.

ABSTRACT

An evaluation of the University of Chicago School Mathematics Project's (UCSMP) *Transition Mathematics* (Third Edition, Field-Trial Version) was conducted during the 2005-2006 academic year. Sixth-grade students (n = 95) in two schools participated in a case study of the UCSMP curriculum materials. Seventh-grade students in four schools participated in a matched-pairs study, in which UCSMP students (n = 142) were matched with comparable students (n = 140) on the basis of two pretests: the *TerraNova Cat Survey Form 17* and the UCSMP constructed *Middle School Mathematics Test*. Comparison students used the curriculum already in place at the school. Both UCSMP and comparison teachers provided information about curriculum implementation and instructional practices, and UCSMP teachers provided evaluations for each chapter they taught.

Students completed three posttest measures: the *Iowa Algebra Aptitude Test*; a multiple-choice test developed by UCSMP using released items from the National Assessment of Educational Progress (NAEP); and a constructed-response test developed by UCSMP also using released items from NAEP and the Trends in Mathematics and Science Study (TIMSS). Sixth-grade students typically outperformed seventh-grade students. There were no significant differences in achievement among seventh-grade students using the UCSMP or comparison curriculum. Sixth-grade students and both groups of seventh-grade students showed significant achievement growth from the beginning to the end of the year.

UCSMP *Transition Mathematics* teachers generally taught through at least Chapter 8 of the text, typically teaching all lessons of the chapter. Overall, sixth-grade *Transition Mathematics* teachers taught 84-92% of the textbook's lessons while seventh-grade *Transition Mathematics* teachers taught from 56-80% of the lessons. At the seventh grade, comparison teachers reported teaching from 40-55% of their textbook.

UCSMP *Transition Mathematics* teachers reported assigning from 70-97% of the homework questions from the lessons they taught. In general, teachers assigned almost all of the *Covering the Ideas* questions (91-99%), the majority of the *Applying the Mathematics* questions (61-99%), but varying amounts of the *Review* questions (27-91%). In contrast, seventh-grade comparison teachers reported assigning from 8-54% of the homework questions in the lessons they taught, frequently using supplementary worksheets as assignments.

UCSMP and comparison teachers responded comparably to questions about the importance of instructional activities, such as helping students learn to solve problems or helping students learn mathematical concepts. UCSMP teachers were slightly more likely to report engaging students in whole class discussions while comparison teachers were slightly more likely to report engaging students in small group work. UCSMP teachers also reported spending about 50% more time than comparison teachers on reviewing homework during a lesson.

All but one of the *Transition Mathematics* teachers would use the text again if provided the opportunity. Teachers generally reported the text was at an appropriate level of challenge for students.

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Overview of the Evaluation Report

This report describes the results of the Field Trial of the Third Edition of *Transition Mathematics*, developed by the University of Chicago School Mathematics Project, and published commercially by Wright Group/McGraw-Hill. The report consists of seven chapters.

Chapter 1 provides background information about the University of Chicago School Mathematics Project (UCSMP), including information about the national situation when UCSMP began in 1983 and when writing for the Third Edition began in 2005. It also describes the secondary (grades 6-12) curriculum developed by UCSMP, including the placement of *Transition Mathematics* within that curriculum and the problems it was designed to address.

Chapter 2 outlines the methodology used during the Field Trial study, including a description of the instruments, the schools, and the comparison curricula. The chapter also documents the comparability of UCSMP and comparison classes.

Chapters 3 and 4 present and discuss the results from the case study of *Transition Mathematics* with sixth-grade students and their teachers. In particular, Chapter 3 documents the implemented curriculum and instructional practices, from the perspectives of the teachers, the students in their classes, and an outside observer. The information in this chapter provides insights about curriculum implementation that may influence the results relative to the achieved curriculum that are highlighted in Chapter 4. Chapters 5 and 6 then present and discuss the implemented and achieved curriculum, respectively, for the study of *Transition Mathematics* at seventh grade, among matched pairs of classes.

Chapter 7 summarizes the findings from the study. In addition, it outlines changes made to the Field Trial version based on input from teachers and students prior to the commercial publication of the curriculum. Whenever feasible, all instruments, rubrics, and tables of contents for the various curricula are provided in the Appendices.

Chapter 1

Background of the Study

The University of Chicago School Mathematics Project (UCSMP) began its work in 1983 with major funding from the Amoco Foundation (now the BP Foundation). In the decade prior to the beginning of UCSMP, numerous publications, both within the broad public community as well as the mathematics education community, focused on the need for changes in education in the United States and major curriculum reform in mathematics. Rather than develop its own recommendations, UCSMP aimed to develop curricula that would attempt to implement the recommendations in these various reports. Throughout its curriculum development and research efforts since that time, UCSMP has responded to changes within mathematics education by the content, instructional approach, and integration of technology in its materials.

At the writing of this report, the work of UCSMP is being conducted by two groups, called the Elementary and Secondary Components. The Elementary Component has developed and continues to revise curriculum materials for students in grades preK-6, with those materials being published by Wright Group/McGraw-Hill under the name *Everyday Mathematics*. The Secondary Component originally developed materials for grades 7-12, but with the development of the Third Edition materials also created curriculum materials for grade 6. This edition is also published by Wright Group/McGraw-Hill. The development of the Third Edition of the Secondary Component materials, occurring from 2005 through 2010, was the latest in a long series of efforts to influence curriculum reform in the United States for students at these grade levels.

This chapter provides an overview of the development of *Transition Mathematics*, the text that is studied in this report. The chapter consists of three sections. The first section provides a brief historical overview of UCSMP, a preK-12 curriculum research and development project, including a discussion of the educational climate in which UCSMP developed its materials. The second section describes the Secondary Component of UCSMP in more detail, providing perspective on where *Transition Mathematics* fits within the entire secondary curriculum. The third and final section discusses problems and issues that are specifically related to *Transition Mathematics*.

An Overview of UCSMP and Educational Reform

In the final quarter of the 20th century, a variety of national commissions and committees made recommendations for reform in school mathematics or in the K-12 educational system as a whole. Reports from mathematics education commissions (e.g., *Overview and Analysis of School Mathematics: Grades K-12*, 1975; *An Agenda for Action: Recommendations for School Mathematics of the 1980s*, 1980), broad-based education commissions (e.g., *A Nation at Risk*, 1984; *Educating Americans for the 21st Century*, 1983), and private organizations (e.g., *Academic Preparation for College*, 1983) all emphasized the need for curricular reform in mathematics. Each report recommended an updating of content to reflect important mathematics for the 21st century, including that *all* students, not just the mathematically talented, be prepared for the future. These reports noted the need for mathematically literate citizens, suggesting that "… America's security, economic health and quality of life are directly related to the mathematics, science and technology literacy of all its citizens" (National Science Board Commission, 1983, p. 12).

The ideas and recommendations percolating through these reports throughout the late 1970s and 1980s helped set the stage for the broad mathematics curricular recommendations from the National Council of Teachers of Mathematics (NCTM) in its 1989 report, *Curriculum and Evaluation Standards for School Mathematics*. This set of standards and recommendations ushered in a major era of mathematics curricular reform, with overall goals outlined for all students:

> Educational goals for students must reflect the importance of mathematical literacy. Toward this end, the K-12 standards articulate five general goals for all students:
>
> - that they learn to value mathematics;
> - that they become confident in their abilities to do mathematics;
> - that they become mathematical problem solvers;
> - that they learn to communicate mathematically; and
> - that they learn to reason mathematically. (p. 5)

Specific content standards were recommended for each of three grade levels (K-4, 5-8, 9-12) and recommendations for four process standards (problem-solving, reasoning, communication, and connections) were outlined for all grades. Throughout the *Standards* document there is an emphasis on updating content, integrating the use of applications and appropriate technology, engaging students in collaborative work to explore mathematics, and expecting students to develop a learning community and explain their thinking.

A report from the Mathematical Sciences Education Board in 1990, *Reshaping School Mathematics: A Philosophy and Framework for Curriculum*, reinforced the recommendations made by NCTM relative to redesigning the mathematics curriculum:

> [T]he United States must restructure the mathematics curriculum – both what is taught and the way it is taught – if our children are to develop the mathematical knowledge (and the confidence to use that knowledge) that they will need to be personally and professionally competent in the twenty-first century. … What is required is a complete redesign of the content of school mathematics and the way it is taught. (p. 1)

As UCSMP began its work in 1983 and continued the development of its secondary materials throughout the 1980s, the project was influenced by the recommendations in drafts and final versions of these reports. The first editions of the UCSMP secondary materials were published commercially from 1990 through 1992, and provided one instantiation of the content and process standards recommended by NCTM in its *Curriculum and Evaluation Standards*. UCSMP incorporated appropriate technology at all grade levels, integrated applications of mathematics into most concepts, updated content to emphasize some content earlier in the curriculum (e.g., exponential functions) and deemphasize other content (e.g., symbolic manipulation of rational expressions), and raised mathematical expectations so that most students at grade level could complete algebra by the end of the eighth grade.

Realizing that significant change could only be accomplished by appropriate changes in curriculum, instruction, and assessment, NCTM followed up the *Curriculum and Evaluation Standards* with the *Professional Standards for Teaching Mathematics* (NCTM, 1991) and the *Assessment Standards for School Mathematics* (NCTM, 1995). These additional documents emphasized the importance of engaging students in worthwhile mathematical tasks and rich

mathematical discourse and broadening assessment beyond timed, on-demand tests. As those standards began to permeate state mathematics frameworks and school mathematics coursework, they influenced further changes in the mathematics curriculum. UCSMP incorporated more writing and enhanced technologies into the second editions of its materials, published commercially from 1995 through 1998.

Toward the end of the 1990s, NCTM built on the work and recommendations from its three *Standards* documents and from other national reports to set the stage for the first decades of the 21st century. In 2000, NCTM published *Principles and Standards for School Mathematics* (*PSSM*), a document that integrated issues of curriculum, instruction, and assessment and built on the knowledge gained from the implementation and attempts at implementation of the previous *Standards* documents. The *PSSM* aimed to

- set forth a comprehensive and coherent set of goals for mathematics for all students from prekindergarten through grade 12 that will orient curricular, teaching, and assessment efforts during the next decades;
- serve as a resource for teachers, education leaders, and policy-makers to use in examining and improving the quality of mathematics instructional programs;
- guide the development of curriculum frameworks, assessments, and instructional materials;
- stimulate ideas and ongoing conversations at the national, provincial or state, and local levels about how best to help students gain a deep understanding of important mathematics. (p. 6)

The *PSSM* recommended content and process standards for grades preK-2, 3-5, 6-8, and 9-12. In particular, number and operations, algebra, geometry, measurement, and data analysis and probability should be included in the content at all levels, with a decrease across the grades in the emphasis on number and operations accompanied by a corresponding increase on algebra. Reasoning and proof, problem solving, connections, representation, and communication are mathematical processes to be integrated at all grade levels and in all content domains.

Curricular reform is an ongoing issue as the public recognizes the importance of mathematics for future student achievement and the country's well-being while also recognizing that mathematics achievement is often not at the desired level. As a result, organizations and commissions have continued to make recommendations for mathematics curriculum in the first decade of the 21st century. To address concerns that the curriculum had too many benchmarks at each grade level, in 2006 NCTM released *Curriculum Focal Points for Prekindergarten though Grade 8 Mathematics: A Quest for Coherence*. The intent of this document was to identify three "big ideas" at each grade level as well as supporting ideas to enhance those concepts. For instance, at grade 6 the curriculum should focus on rational number fluency, ratios and rates, and algebraic expressions and equations. At grade 7, the curriculum should focus on proportionality, surface area and volume, and solving linear equations. Then, at grade 8 the curriculum should focus on linear functions, the analysis of two and three dimensional figures, and the analysis and interpretation of data.

Other projects also focused on raising the mathematical bar, particularly at the high school level. The *College Board Standards for College Success: Mathematics and Statistics* (College Board, 2006), the American Diploma Project (Achieve, 2007), and *Guidelines for Assessment and Instruction in Statistics Education* (American Statistical Association, 2007) provide insights into mathematical expectations needed for success in college or in the workplace. Because of the

No Child Left Behind (NCLB) legislation in 2001, many states moved to raise the bar in terms of mathematics, often using recommendations from NCTM, Achieve, the College Board, and similar reports to design their frameworks. In 2008, Dossey, Halvorsen, and McCrone reported that eleven states would require all high school graduates to have the equivalent of Algebra I, Geometry, and Algebra II by 2012; that number has likely increased since the time of their report.

This was the educational climate in which UCSMP began the development of the third editions of its materials for grades 6-12 in 2005. More specific details about the history and development of UCSMP, both the elementary and secondary materials, can be found in Bell and Isaacs (2007), Usiskin (1986-1987, 2003, 2007), and on the UCSMP website (http://ucsmp.uchicago.edu/).

An Overview of the Secondary Component of the UCSMP

Three major goals spurred the development of the First and Second Editions of the UCSMP Secondary Component materials: (1) to upgrade students' achievement in mathematics; (2) to update the mathematics curriculum in terms of content; and (3) to increase the number of students who take mathematics beyond algebra and geometry. As development for the Third Edition began, these goals remained in place. In particular, there was a sense that testing alone is not enough to upgrade student achievement, that technology is a critical component of updating the curriculum, and that the mathematics students take must be appropriate to their needs (Z. Usiskin, 2005, remarks at Field Trial Teachers' Meeting).

All the curriculum materials developed by the Secondary Component have the same basic elements. The materials have a **wide scope** in terms of content, with algebra, geometry, discrete mathematics, and statistics/probability embedded into all courses as appropriate. In addition, **reading** is integral to the materials, with an assumption that students need to learn to read mathematics as well as read to learn mathematics and should be able to answer questions related to that reading. **Problem-solving and applications** are embedded throughout so that students have multiple opportunities to explore where the mathematics they study might be used to solve real-world problems; in addition, students should have exposure to varied approaches to solving problems. **Appropriate technology** should be integrated as a means to explore mathematics as well as do mathematics; appropriate technology might involve scientific calculators, graphing calculators, computer algebra systems, spreadsheets, interactive geometry drawing tools, and the Internet.

The secondary materials use a **modified mastery approach** to instruction supported by continual review of important concepts, with review questions from previous lessons included in each question set and in subsequent chapters, and with end-of-chapter materials (summary, self-test, and review) keyed to chapter objectives. A **multi-dimensional approach** to understanding means that concepts are presented from a balanced view that considers **S**kills, **P**roperties, **U**ses, and **R**epresentations of concepts. This SPUR approach ensures that students focus not just on the algorithms or procedures but also on the underlying principles, the applications, and the visual diagrams and representations that enhance understanding. Opportunities for active learning are encouraged through the use of **Quiz Yourself** questions throughout a lesson to check for understanding, **Guided Examples** that are partially completed solutions to help students get started, and **Activities** to explore ideas individually or in small groups. **Projects** at the end of chapters provide tasks that can be completed over an extended period of time to explore topics in more depth (Senk, 2003; Usiskin, 2007).

Four types of questions are found in all question sets. **Covering the Ideas** questions focus on the core concepts of the lesson. **Applying the Mathematics** questions extend the core ideas to new settings or in ways different from those expressly described in the lesson. **Review** questions provide opportunities for students to continue working on concepts from previous lessons or chapters. Finally, **Exploration** questions encourage students to extend the ideas of the lesson or to explore some historical connection to the mathematical concepts. The question sets are designed so that, with the exception of the Exploration questions, students are generally expected to complete most of the questions.

From 1983 until the development of the Third Edition materials, the Secondary Component created materials for grades 7 through 12. However, since 1983 more and more school districts moved from *junior high schools* devoted to grades 7-8 to *middle schools* comprising grades 6-8, with the grades 6-8 middle school structure now more common than the grades 7-8 junior high structure (http://nces.ed.gov/fastfacts/display.asp?id=84, downloaded October 7, 2011). Consequently, a change in style from elementary mathematics to secondary mathematics is more easily made for some students at grade 6 rather than grade 7. In addition, teacher professional development is more efficient if the curriculum materials have the same style for all grades in the school. So, the UCSMP Secondary Component developed a new course for grade 6 (*Pre-Transition Mathematics*) as well as Third Editions of its previous grades 7 through 12 materials.

In thinking about selection of the content for the third editions, authors took into account that students entering seventh grade often had more mathematical knowledge than was true at the time of the second edition, likely reflecting the influence of the NCTM *Standards* and the move by many states to raise mathematics standards. Many students who had studied from the UCSMP *Everyday Mathematics* curriculum were ready for greater challenge as they entered the middle grades. Indeed, results from the National Assessment of Educational Progress indicate that mathematics scores for students at ages 9 and 13 had increased since the early 1990s, and more high school students had taken at least Algebra II (Perie, Moran, & Lutkus, 2005).

The seven courses comprising the secondary materials are described in the following paragraphs. (For more information, see descriptions in the *UCSMP Implementation Guide*, 2009).

Pre-Transition Mathematics (Year 1) integrates arithmetic with work in statistics, geometry, and algebraic thinking. It takes advantage of what the project has learned from students who have used *Everyday Mathematics* as their elementary curriculum and/or *Transition Mathematics* as a middle grades course. Hence, some material previously in *Transition Mathematics*, particularly models for the four arithmetic operations and work with measurement, has moved to *Pre-Transition Mathematics*. In addition, *Pre-Transition Mathematics* explores algebra to describe generalizations, solve simple equations, and write formulas. Although there is close alignment with *Everyday Mathematics*, the *Pre-Transition Mathematics* text is written in the style of the UCSMP secondary materials.

Transition Mathematics (Year 2) serves as a pre-algebra text, but with significant geometric work integrated with algebra. Algebra and geometric concepts are connected to measurement, probability, and statistics. In addition to using variables as unknowns, variables are used to generalize patterns. More work with algebra is found in the Third Edition of the text than in previous editions because students are entering the course with a stronger mathematics background than was true when previous editions were written. Appropriate technology (e.g., graphing calculators, spreadsheets, and interactive geometric software) is used throughout to explore mathematics.

Algebra (Year 3) explores a wide range of functions, including exponential functions, while also weaving statistics and geometry with algebra. Graphing calculator technology is assumed, with some access to computer algebra systems expected for classroom use. This enables work with expressions, equations, and functions to be studied via graphs, symbols, and tables. Work with graphing of linear equations and solving of equations and inequalities occurs earlier in the Third Edition than in previous editions.

Geometry (Year 4) blends synthetic approaches to geometry with significant work with transformations and coordinates. Congruence, similarity, and symmetry are defined using a transformational perspective. The development of proof-writing skills is carefully sequenced, beginning with one-step proofs and building to more lengthy proofs. Technology, including graphing calculators and interactive geometry software, is integrated throughout as appropriate.

Advanced Algebra (Year 5) continues to emphasize facility with algebraic expressions and forms. The text uses a function perspective, with significant work with linear, quadratic, exponential, logarithmic, power, root, and polynomial functions. Geometric ideas studied in previous courses are used as contexts and connections to enhance the study of algebra, including continued work with transformations. Computer algebra systems and interactive geometry software are assumed and used as appropriate.

Functions, Statistics, and Trigonometry (Year 6) integrates the three content areas in the title, with connections made between functions and statistics and with trigonometry. Both descriptive and inferential statistics are studied along with combinatorics and probability. Modeling with statistics, functions, and trigonometry is a major feature of the course. Significant work with computer algebra systems and with statistical software (either computer or calculator) is integrated into the course. Enough work with trigonometry is available to constitute a typical course in trigonometry and circular functions as preparation for precalculus.

Precalculus and Discrete Mathematics (Year 7) is designed to prepare students for rigorous mathematical study in college. Precalculus topics include polynomial and rational functions, a study of advanced properties of functions, including limits, and the underpinnings of the derivative and integral. Polar coordinates and complex numbers are also topics of study. Discrete mathematics topics include work with recursion, permutations and combinations, and logic. Mathematical thinking, with particular attention to proof, is a unifying theme of the course. Computer algebra systems are assumed throughout the course.

The seven courses are designed so that average or above-average students who are on grade-level would begin with *Pre-Transition Mathematics* in the sixth grade, and continue one course each year culminating in *Precalculus and Discrete Mathematics* in the twelfth grade. Advanced students might begin the sequence a year or two earlier and struggling students might begin a year or two later. One goal of UCSMP is that all high school graduates would complete at least through *Advanced Algebra*, with college-intending students completing through *Functions, Statistics, and Trigonometry*, and those intending to major in scientific or technical fields completing *Precalculus and Discrete Mathematics*.

All textbook materials, beginning with the first editions, were developed over multiple years by teams of authors, including those with secondary school teaching experience. Every UCSMP textbook underwent field tests, with input from teachers and students used to revise the materials prior to commercial publication. In addition to these formative field tests, summative evaluations of the first five courses were also undertaken to compare the achievement of students using the relevant UCSMP text with students using a comparable comparison text already in place at the school. Overall, students using UCSMP texts score as well as or better than their comparison

peers on traditional tasks, and outperform them on tasks related to content and applications specific to the UCSMP curriculum (Hedges, Stodolsky, Mathison, & Flores, 1986; Thompson, Senk, Witonsky, Usiskin, & Kaeley, 2001, 2005, 2006; Thompson, Witonsky, Senk, Usiskin, & Kaeley, 2003)

The Third Editions of the UCSMP secondary materials (and First Edition of *Pre-Transition Mathematics*) were developed from 2005 through 2008, with subsequent revisions made for commercial publication. Commercial versions were published from 2008 through 2010. Third Editions built on the work of previous editions, maintaining those features previously found to be effective and beneficial, but also incorporating more active learning, cooperative group work, and technology than previous editions.

A Description of UCSMP *Transition Mathematics*

The First Edition of *Transition Mathematics*, developed beginning in 1983 and published commercially in 1990, addressed six problems:

- Many students are not able to apply the arithmetic they know, and need many opportunities to apply those concepts.
- The mathematics curriculum has lagged behind available and inexpensive technology, so the curriculum needs to integrate and assume appropriate technology.
- Large numbers of students fail algebra, so they need opportunities before a formal algebra course to explore important algebraic concepts and build a solid understanding of them.
- Many students who are successful in algebra still struggle with geometry, so fundamental geometry concepts should be integrated with algebra and provide a foundation on which students can build in a formal geometry course.
- Many students do not read their mathematics text, so the text needs to be written in a manner that encourages students to read as a part of learning.
- Students are generally not skillful enough, so they need exposure to many non-routine problems, to varied wordings, and to problems with complicated numbers.

The Second Edition of *Transition Mathematics*, developed from 1992 to 1993 and published commercially in 1995, continued to address these six problems. Given the recommendations for more active learning in curricular documents at that time, the Second Edition also incorporated more explorations and group activities, projects, and items on which students were expected to explain their thinking.

As planning for the Third Edition began, information from many users of earlier editions of *Transition Mathematics* suggested that changes were needed to enhance the rigor and expectations of the text. Hence, some content previously found in *Transition Mathematics*, such as models for the arithmetic operations and measurement, was moved to the new *Pre-Transition Mathematics* course, and some algebraic concepts, such as evaluating expressions and basic work with graphing, were moved earlier in the course in order to enhance students' experiences with important algebraic concepts. In addition, the increased availability of graphing calculators and other technology, such as spreadsheets, suggested that developers should incorporate technology beyond scientific calculators into the text. More specifics about the Third Edition of *Transition Mathematics* are discussed in Chapter 2 of this report.

With each of the previous two editions, both formative and summative evaluations were conducted about the effectiveness of the materials. Each study used a matched-pair design and

evaluated students' achievement using multiple measures. A national study of the First Edition was conducted from 1985-1986 with 1048 students in 41 classes using UCSMP *Transition Mathematics* and 976 students in 38 classes using the comparison curriculum already in place at the school (Hedges, Stodolsky, Mathison, & Flores, 1986). Although there was considerable variability in performance across schools, students using *Transition Mathematics* generally outperformed students in the comparison classes when calculators were permitted and scored more comparably to comparison students when calculators were not allowed. Further, students in seventh grade generally scored better than those students taking the same course in a later grade.

During the 1992-1993 school year, an evaluation of the Second Edition of *Transition Mathematics* was conducted with 12 pairs comparing achievement of students using the Second Edition of *Transition Mathematics* (n = 212) to that of students using the First Edition of *Transition Mathematics* (n = 203), and 4 pairs comparing the achievement of students using the Second Edition of *Transition Mathematics* (n = 41) with the achievement of students using the comparison curriculum (n = 50) already in place at the school (Thompson, Senk, Witonsky, Usiskin, & Kaeley, 2005). No significant differences in achievement were found between students in the Second Edition and First Edition matched pairs or between students in the Second Edition and non-UCSMP sample.

As in the previous studies, formative and summative evaluations of the Third Edition of *Transition Mathematics* were conducted. The remainder of this report discusses the details of that evaluation study.

Chapter 2

Design of the Study

The evaluation study of *Transition Mathematics* (Third Edition) combined elements of a formative evaluation and a summative evaluation. The purpose of the formative evaluation was to obtain feedback on the Third Edition materials as soon as possible to guide further revisions to additional chapters during the school year and to guide revisions to the Field-Trial version prior to commercial publication. Teachers' comments about the lessons, the questions, the use of technology, and the various features and approaches helped inform authors and developers about changes from the Second Edition which were effective and those which were not.

The purpose of the summative portion of the evaluation was to compare the enactment and effectiveness of *Transition Mathematics* (Third Edition, Field-Trial Version) to the enactment and effectiveness of the curriculum materials being used in comparison classes. Results from both the formative and summative portions of the evaluation were used by authors and editors to make final changes to the materials in preparation for commercial publication.

This chapter describes the overall design of the study in five main sections. The first identifies the research questions that guided the study. The second discusses the procedures used in the study, including the selection of schools, the structure of the design, and the types of data collected throughout the school year. The third describes the instructional materials used by the schools participating in the study. The fourth describes the instruments used to collect data to answer the research questions; copies of the instruments are included in the Appendices. The fifth and final section provides demographic information about the samples, including student performance on the pretests used to measure the comparability of the classes in the study.

Research Questions

The evaluation study focused on five broad research questions. The first two questions relate to teachers' use of the materials.

1. How do teachers use and implement their respective curriculum materials?
   a. What lessons do UCSMP *Transition Mathematics* (Third Edition, Field-Trial Version) and comparison teachers use, and what questions do they assign to students?
   b. How do UCSMP *Transition Mathematics* (Third Edition, Field-Trial Version) teachers use Review questions within a lesson and the end of the chapter materials (i.e., Self-Test and SPUR Review)?
   c. What is the nature of the instructional practices used by UCSMP *Transition Mathematics* (Third Edition, Field-Trial Version) and comparison teachers?
   d. How do teachers use technology (e.g., scientific and/or graphing calculators) with their respective curriculum materials?
2. What support, if any, do teachers need when using the UCSMP *Transition Mathematics* (Third Edition, Field-Trial Version) curriculum materials?
   a. What issues and challenges do teachers face when integrating technology with the curriculum?

b. Given the expanded role of advanced technology (e.g., graphing calculators) in the middle grades, what types of additional support, mathematical or pedagogical, do teachers need?

The final three questions relate to what students learn from the materials.

3. How does the achievement of students in classes using UCSMP *Transition Mathematics* (Third Edition, Field-Trial Version) compare to that of students using the comparison curriculum already in place at the school, when applicable? (Note: As described in the final section of this chapter, in two schools using *Transition Mathematics* with sixth grade students, no comparison classes were available.)
   a. In particular, how proficient are students in the following content areas: variables and their uses; expressions, equations, and inequalities; measurement; transformations and symmetry; geometric figures and their properties; and arithmetic?
   b. How is achievement related to four dimensions of understanding: skills, properties, uses, and representations?
4. How do students' achievement and understanding of key content topics change over the course of the school year?
   a. In particular, how does students' achievement change over the school year in terms of paper-and-pencil skills, facility with properties of mathematics, the ability to apply mathematics in real-world contexts, and the ability to construct and interpret representations of mathematics?
   b. How does students' achievement change over the school year in terms of specific content themes appropriate to the course, namely variables and their uses; expressions, equations, and inequalities; measurement; and transformations and symmetry?
5. How do students use technology relevant to their curriculum?

As appropriate, the evaluation study was interested in determining how students and teachers using *Transition Mathematics* (Third Edition, Field-Trial Version) compare to students and teachers using the curriculum materials already in place at their school. The aim was not to have a "horse race" but to be able to understand differences that occur in relation to differences in aims and goals of different curriculum materials.

In 2004, the National Research Council released a report on the evaluation of curricular effectiveness, with significant focus on evaluation studies of curricular materials developed in response to the NCTM *Standards* documents. One of their recommendations was that curriculum studies need to include information about the implementation of the curriculum in addition to insights into student achievement when using the curriculum. Thus, as planning for the evaluation study of *Transition Mathematics* began, the recommendations of the National Research Council were heeded and more information about implementation was collected, from both UCSMP and comparison teachers, than was true in past UCSMP evaluation studies.

Evaluation Study Procedures

The evaluation study of *Transition Mathematics* (Third Edition, Field-Trial Version) was conducted during the 2005-2006 school year. This section outlines the procedures used in designing the study and collecting data.

Recruitment and Selection of Participating Schools

Because of time delays related to UCSMP obtaining final approval from the publisher for beginning the third editions, the solicitation of study schools for the 2005-2006 school year did not occur until late in the 2004-2005 school year. In late Spring 2005, a *Call for Schools* to participate in the 2005-2006 field test studies was made via the UCSMP website and UCSMP publications in an attempt to identify a range of schools which might be interested and able to field test the *Transition Mathematics* (Third Edition) text. The Call also identified obligations of both UCSMP and the participating schools. In particular, UCSMP agreed to provide curriculum materials for students and teachers in field-test classes and instruments (questionnaires and tests) for both students and teachers; to reimburse for any mailing expenses; and to offer a small honorarium to participating teachers (both UCSMP and comparison teachers). Interested schools needed to provide similar students for UCSMP and comparison classes; agree to maintain the integrity of classes throughout the school year; identify teachers (UCSMP and comparison) who would use the appropriate curriculum materials; have available appropriate technology for the UCSMP classes; agree to five days of testing during the year; permit classroom observations of UCSMP and comparison classes; facilitate interviews with UCSMP and comparison teachers; and enable UCSMP teachers to attend two one-day meetings at the University of Chicago, for which UCSMP would cover travel and subsistence. Interested schools completed an application to obtain basic information about the demographics of potential study classes. Copies of the Call and the Application can be found in Appendix A.

Schools were not recruited based on the non-UCSMP text in use for comparison classes. Rather, among those schools which submitted an application, UCSMP staff attempted to select schools that might represent a broad range of educational conditions in the United States in terms of curriculum and demographic characteristics. As much as possible, UCSMP looked for schools with at least four classes able to participate in the study, with the expectation that two classes would use the UCSMP *Transition Mathematic*s (Third Edition, Field-Trial Version) curriculum and two would use the curriculum materials already in place at the school.

Transition Mathematics is designed for students who are at or above seventh grade level on a standardized test. UCSMP recommended that students in the top 10-20% complete *Transition Mathematics* as sixth graders, with the next 50% taking the course as seventh graders, the next 20% as eighth graders, and the remainder as ninth graders. Because *Transition Mathematics* has prealgebra as one of its foci, students who are successful in the course usually take algebra the following year.

Twelve schools completed the application. Two of these were schools that UCSMP actively recruited for participation because the school district used *Everyday Mathematics* (the UCSMP elementary curriculum) in some part of the K-6 curriculum, even though *Transition Mathematics* was not then used at the middle school. From the original set of twelve applications, seven schools were invited to participate in the study. However, one school withdrew from the study at the beginning of the 2005-2006 school year before any pretesting because the teacher who had pursued the application left the school district and no other teacher was willing to serve as the field-trial teacher.

At two of the schools not invited to participate in the study, the sample sizes at seventh grade would have been small, with no comparison classes. At the other three non-invited schools, it was not clear that potential students were part of the target population in terms of ability. In addition, one of the five schools operated on a 4 by 4 block schedule, and it was impossible for the project to provide curriculum materials on an acceptable time table.

Among the six schools (coded 02 through 07)[1] which ultimately accepted the invitation to participate, two field-tested *Transition Mathematics* with advanced sixth grade students but no comparison students. At the other four sites, field testing occurred with seventh grade students and appropriate comparison students. Specific demographics for these six schools, including school, student, and teacher demographics, are described in the final section of this chapter.

There were classes in three schools in which the teachers were authors or peers of authors. These teachers field-tested the materials and informally provided information to the project about the curriculum, but were not part of the formal study.

School-Year Procedures

Table 1 summarizes the procedures used during the study.

Table 1. Summary of Procedures Used in the *Transition Mathematics* Field Study

Time Frame	UCSMP Teachers	Comparison Teachers	Students
Beginning of School	• Initial Questionnaire • Calculators lent to schools	• Initial Questionnaire	• *TerraNova CAT Survey Form 17* • *Middle School Mathematics Test*
Ongoing	• Chapter Evaluation Form for each chapter taught	• Chapter Coverage Form for each chapter taught	
Fall	• Teacher Focus Group meeting • Observation visits to two schools	• Observation visits to two schools	
Spring	• Teacher Focus Group meeting • Observation visits to all schools • Interviews with teachers	• Observation visits to all schools • Interviews with teachers	
End of School Year	• Teacher Questionnaire • Opportunity-to-Learn Form	• Teacher Questionnaire • Opportunity-to-Learn Form	• *Iowa Algebra Aptitude Test* • *Algebra/Geometry Readiness Test: Part One* • *Algebra/Geometry Readiness Test: Part Two* • *Student Information Form*

UCSMP *Transition Mathematics* (Third Edition, Field-Trial Version) teachers received no direct inservice or professional development, either before or during the school year. Although teachers had a tentative Table of Contents for the entire book when school began, they actually received the book in four spiral-bound parts throughout the year: Chapters 1-4 (at the beginning of the school year); Chapters 5-8 in the fall; Chapters 9 and 10 in the winter; and Chapters 11

[1] Initially, there were plans to include a school in which an author taught *Transition Mathematics* as part of the formal study, so this school was assigned school code 01.

and 12 in the spring. (Teachers received a loose-leaf copy of Chapter 1 in early August for the purposes of initial planning.) Additionally, teachers received lesson notes, answers to questions, and a chapter test, one chapter at a time, throughout the school year.

Through arrangements with Texas Instruments and Casio, UCSMP received enough calculators to lend to schools in sufficient numbers so that they could, in turn, lend the calculators to students for use in class and at home. Prior to the loan, schools signed agreements accepting responsibility for the return of all calculators, or for providing replacements. All study schools received TI84 Plus calculators, including overhead versions and related software; author schools received Casio 9750 calculators. It was up to the schools to determine whether they would, in fact, lend the calculators to students for home use or use them only during class.

To assist with the Formative Evaluation, the UCSMP Third Edition teachers completed a Chapter Evaluation form (see description in the section of this chapter on Instruments) after completing each chapter. Comparison teachers completed a comparable Chapter Coverage form to identify the lessons and questions assigned from their textbook.

The UCSMP Third Edition teachers also met in Chicago twice during the school year, once in the fall (October 28, 2005) and once in the spring (April 1, 2006) to provide feedback to the project director, staff, and authors about the curriculum materials. At these meetings, the text was discussed lesson by lesson, with teachers giving insights into aspects of the lesson narratives, questions, or activities that were effective or not. In addition, teachers had opportunities to discuss issues about reading and writing, the use of technology, the implementation of activities and tests, and sequence of content; these informal discussions provided some informal professional development among teachers participating in the study. Further, the meetings enabled project personnel to learn about any unusual circumstances at the school that potentially could influence the study and/or the achievement results.

At the beginning of the school year, teachers (UCSMP and comparison) completed an initial teacher questionnaire in which they provided demographic information (e.g., number and kind of degrees or years teaching) as well as their attitudes and expectations about the use of certain instructional strategies in the course during the school year (e.g., use of reading or technology, expectation for problem-solving). Students completed two pretests designed to assess prerequisite knowledge about content to be studied in the course: a standardized test (*TerraNova CAT Survey*, Form 17), and a UCSMP developed test (*Middle School Mathematics Test*). The two pretests were used to determine whether pairs of classes were comparable in terms of prerequisite knowledge, when comparison classes existed, and to determine baseline data from which to measure growth over the course of the year for all students participating in the study, regardless of curriculum used.

In the fall, two schools were visited for one day to gain early insight into how the materials were functioning and to determine any issues with the study that needed to be addressed. Both UCSMP Third Edition and comparison classes were visited and both UCSMP Third Edition and comparison teachers were interviewed. In the spring, each school in the study was visited for three days, with Third Edition and comparison classes being observed and all teachers being interviewed. Observations and interviews were conducted by the UCSMP Director of Evaluation, who was not involved in the writing of any of the Third Edition materials although she had been involved in writing previous editions of two of the high school textbooks.

Near the end of the school year, students completed three posttests: the *Iowa Algebra Aptitude Test*, a standardized measure; and two UCSMP developed tests, the multiple-choice *Algebra/Geometry Readiness Test: Part One* and the constructed-response *Algebra/Geometry*

Readiness Test: Part Two. In addition, students completed a Student Information Form (without names attached) in which they provided their perspective on the frequency with which certain instructional strategies (e.g., reading, writing) were employed in their class, their frequency of homework, and their use of technology. Neither pretest nor posttest scores had any influence on students' grades in the course, but students were encouraged to do their best.

Teachers also completed several forms near the end of the school year. On the end-of-year teacher questionnaire, teachers reported their perceptions on the frequency with which certain instructional strategies (e.g., reading, writing, technology) were employed as well as the extent to which certain approaches on the initial teacher questionnaire were actually implemented in the classroom. Teachers also reported, for each posttest item, whether they had taught the content needed for their students to answer the items. Once all end-of-year teacher materials were completed and returned, including loaner calculators, teachers (UCSMP and comparison) received a small honorarium.

Grouping and Matching of Classes

Many factors can influence students' learning, including their ability and prerequisite knowledge, the time allocated to mathematics instruction, different opportunities to learn mathematics, the socioeconomic status of the school population, the size of classes, the community's expectations for mathematics achievement, the general school climate and expectations for learning, and differences in teachers' expectations and experience. To control for these factors, UCSMP uses the class as the unit of analysis in its studies and also uses a matched-pair design whenever possible. In such a design, classes in the same school are matched on the basis of students' prerequisite mathematical knowledge. Each matched pair is then a mini-study, replicated as many times as there are pairs. This approach enables the overall evaluation study to consider local contexts while still allowing generalizations through aggregation, particularly if the results from the various mini-studies are consistent.

Among the participating schools, two schools (02 and 04) used UCSMP *Transition Mathematics* (Third Edition, Field-Trial Version) with sixth grade students. One school had two classes and one had three. The study of these five classes taken together is viewed as a case study for the purposes of this evaluation, with these sixth graders considered one group for the purposes of aggregation.

In four schools (03, 05, 06, and 07), participating students were in seventh grade and were generally randomly assigned to classes. However, at three of these sites, teachers were not willing to be randomly assigned, and these three school applications identified the teacher who had agreed to be the UCSMP field-trial teacher and the teacher who had agreed to serve as the comparison teacher. At School 06, there were two UCSMP and two comparison teachers, and assignment to field trial and comparison classes was done by school personnel through a random draw of names.

To determine which pair of classes within these four schools would be matched, the two pretest means on the *TerraNova* test and the UCSMP-designed test for all classes in the school were compared across the different curricula using results from just those students in each class who took all pretests and posttests and remained in the same class throughout the school year. (Students who changed classes typically changed teachers, and thus, curriculum materials; therefore, such students were dropped from the final sample.) Two-tailed *t*-tests were used for potential pairs to determine the extent to which the pairs were good matches. Because of the two comparisons with the same groups of students, a Bonferroni correction (Kleinbaum, Kupper, &

Muller 1988) was used to lessen the chance that a significant difference would be found by chance. In order for classes to match, the following conditions had to be met:

- On each pretest, the difference in the means was not significant ($p \leq 0.025$);
- Neither class could have more than twice the number of students as the other class;
- No additional information suggested that the classes were different in some fundamental way.

These constraints gave the study eight matched pairs of seventh grade students, in which one class in each pair used UCSMP *Transition Mathematics* (Third Edition, Field-Trial Version)[2] and the other pair used the comparison curriculum already in place at the school.[3]

Instructional Materials

Features of *Transition Mathematics*

As indicated in Chapter 1 of this report, *Transition Mathematics* (Third Edition) (Viktora, Capuzzi, Cheung, Heeres, Highstone, Metcalf, & Usiskin, 2005) maintains many of the features that have been a hallmark of the UCSMP materials since their inception. For instance, the text emphasizes four dimensions of understanding called SPUR dimensions: Skills, Properties, Uses, and Representations. As described in each Chapter Review of the textbook,

- *Skills* "deal with the procedures used to get answers,"
- *Properties* "deal with the principles behind the mathematics,"
- *Uses* "deal with applications of mathematics in real situations," and
- *Representations* "deal with pictures, graphs, or objects that illustrate concepts."

Most lessons begin with a realistic context or a representation of the concept; as much as possible, lessons integrate several of the SPUR dimensions; and all chapters attempt a balanced view across the four dimensions. The textbook encourages multiple solutions to problems, often illustrating several solution approaches.

Throughout *Transition Mathematics*, students are encouraged to read the text, and the first section of each question set focuses on *Covering the Ideas*, designed to ensure that students have understood the core concepts of the lesson. In addition, writing and the explanation of one's thinking is expected throughout. To facilitate this expectation, a special font is used to model for students what they are expected to write for a solution. Review questions, from previous lessons in a chapter, from previous chapters, or from previous courses, are a part of every question set.

Many chapters contain In-Class Activities, which provide an opportunity for students to work with peers to focus on conceptual concepts, often with hands-on materials. A Self-Test and SPUR Chapter Review provide opportunities for students to solidify and master concepts. Technology is integrated throughout the text as appropriate, with the expectation that students will have access to graphing calculators in class and for homework and access to spreadsheets at least in class.

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[2] In the remainder of this report, *Transition Mathematics* or *Transition Mathematics* (Third Edition) is understood to mean *Transition Mathematics* (Third Edition, Field-Trial Version). Information about changes to the Field-Trial Version prior to commercial publication is discussed in the final chapter of this report.

[3] At School 07, there were two UCSMP classes and only one comparison class. The best matched pair was formed; results from the non-matched UCSMP class (Class 024) are found in Appendix F.

Features of Comparison Materials

In the four schools participating in the matched pair study, four different comparison curricula were used.

- School 03 used teacher created materials adapted from UCSMP *Transition Mathematics* (Second Edition) (Usiskin et al., 1995) and the *Connected Mathematics Project* (Lappan et al., 2006). This school had previously been using the Second Edition of *Transition Mathematics*. Because of upcoming adoption decisions in the district and uncertainty about any new editions of UCSMP, the school planned to pilot *Connected Mathematics* in a few classes taught by one teacher. However, the school had difficulty receiving the materials in the early part of the school year. So, in November and December, the teacher reverted to using parts of *Transition Mathematics* (Second Edition). During the second semester, the teacher created her own materials based on the perceived needs of her students; she felt she was playing catch-up because of the difficulty in obtaining a text at the beginning of the school year. Given the unusual situation at this school, it was not viewed as appropriate to consider any particular textbook as the comparison textbook at this school, but rather, to consider the curriculum as teacher created with focus on addressing content for the state assessment.
- School 05 used *Middle School Math*, Course 2 (Charles, Dossey, Leinwand, Seeley, Vonder Embse et al., 1999) from Scott Foresman-Addison Wesley. This textbook typically begins a chapter with a project on which students might work throughout the chapter. In addition, each lesson generally begins with an *Explore* opportunity to address conceptual understanding of the topic of the lesson, sometimes with hands-on materials. Applications regularly appear in question sets, which also contain a few initial questions designed to *Check Your Understanding* and a final set of questions entitled *Mixed Review*. Technology pages are interspersed throughout the text, as are pages on Interdisciplinary Team Teaching to illustrate the connection of mathematics with other school subjects.
- School 06 used *Passport to Algebra and Geometry* (Larson, Boswell, Kanold, & Stiff, 1999) from McDougal Littell. The textbook integrates applications throughout the book. Career interviews with various professionals provide insights into how mathematics is used in real-world jobs. Every chapter has at least two lab activities which provide opportunities for conceptual development, often with hands-on materials such as algebra tiles or two-color counters. Each chapter also includes a *Communicating About Mathematics* page, which provides an opportunity to read and write about mathematics in an interdisciplinary setting.
- School 07 used *Mathematics: Concepts and Skills*, Course 2 (Larson, Boswell, Kanold, & Stiff, 2001) from McDougal Littell. This textbook also regularly includes applications throughout the text, both in the lesson narrative and in the question sets. Each chapter begins with career links and with a *Getting Ready* page which previews the chapter, provides a quiz on readiness skills, and offers study tips. Some, but not all, question sets include a *Mixed Review* section of problems. In addition, some problems are labeled for possible use with calculators, and each question set contains some problems labeled *Mathematical Reasoning* in which students are expected to explain their thinking. Each chapter contains at least one *Developing Concepts* activity, designed to provide students with hands-on activities to address the concepts in the

upcoming lesson. Opportunities exist throughout the text to engage with hands-on materials, such as algebra tiles. Brain games are found at the end of each chapter. At the end of every third chapter, a project is suggested for possible completion.

Overall, *Transition Mathematics* and the three comparison textbooks have fairly similar content; the content in the teacher created curriculum at School 03 is also consistent with that in the textbooks used in the study. All address operations with rational numbers and integers; ratios, rates, proportions, and percents; expressions, equations, and inequalities; basic geometry, including lines, angles, polygons, transformations (reflections, rotations, and translations); measurement for two- and three-dimensional shapes, including perimeter, area, and volume; scale drawings; nets for solids; the Pythagorean theorem; linear equations and inequalities, including graphing; basic concepts related to probability; and basic statistics and data analysis, including measures of central tendency, and types of graphs, including bar graphs, scatterplots, and box-and-whisker plots. All but *Transition Mathematics* include work with stem-and-leaf graphs. Both *Passport to Algebra and Geometry* and *Mathematics: Concepts and Skills* include work with polynomials and writing linear equations in slope-intercept form. Only *Transition Mathematics* and *Middle School Math: Course 2* include work with tessellations. Only *Transition Mathematics* includes work with confidence intervals.

The chapter titles, brief content review, and description of textbook narrative and exercises appear to suggest that students have nearly the same potential opportunities to learn mathematics content across the different curricula. However, the sequence and emphasis of concepts varies, as do connections between and among concepts. Teacher reports about coverage, to be discussed in Chapter 5, provide information about the extent to which potential opportunities for comparable learning in the textbooks result in comparable opportunities for learning in actual classroom practice. Table 2 contains the chapter titles for *Transition Mathematics* (Third Edition) and for the three comparison texts as well as topics covered within the teacher created curriculum in School 03. A complete Table of Contents for *Transition Mathematics* (Third Edition, Field-Trial Version) can be found in Appendix B.

Table 2. Chapter Titles for Textbooks Used in the *Transition Mathematics* (Third Edition) Evaluation Study and Topics Taught in the Teacher-Created Curriculum

Ch	*Transition Mathematics* (Third Edition, Field-Trial) (All schools)	Teacher Created Curriculum Topics (School 03)	*Middle School Math* (Course 2) (School 05)	*Passport to Algebra and Geometry* (School 06)	*Mathematics: Concepts and Skills* (Course 2) (School 07)
1	Reading and Writing Numbers	Factors and Divisibility & Rounding/Place Value	Making Sense of the World of Data	Exploring Patterns	Operations with Numbers
2	Representing Numbers	Rational Numbers (Bits and Pieces II from *Connected Mathematics*)	The Language of Algebra: Formulas, Expressions, and Equations	Investigations in Algebra	Operations in Algebra
3	Using Variables	Decimals and Large/Small Numbers (*Transition Mathematics*, Second Edition)	Number Sense: Decimals and Fractions	Modeling Integers	Operations with Integers
4	Representing Sets of Numbers and Shapes	Uses of Variables (*Transition Mathematics*, Second Edition)	Operations with Fractions	Exploring the Language of Algebra	Algebra and Equation Solving
5	Patterns Leading to Addition and Subtraction	Proportions, Ratios, Venn Diagrams	Geometry and Measurement	Exploring Data and Graphs	Rational Numbers and Percents
6	Some Important Geometry Ideas	Rates and Ratios	Ratios, Rates, and Proportions	Exploring Number Theory	Operations with Rational Numbers
7	Multiplication in Geometry	Equations or Expressions	Proportion, Scale, and Similarity	Rational Numbers and Percents	Proportional Reasoning
8	Multiplication in Algebra	Shape Properties & Scale Drawings	Percents	Proportion, Percent, and Probability	Geometry Concepts
9	Patterns Leading to Division	Measurement (perimeter, circumference, area, surface area, volume)	Integers	Real Numbers and Inequalities	Real Numbers and Solving Inequalities
10	Linear Equations and Inequalities	Coordinate graphing	The Patterns of Algebra: Equations and Graphs	Geometry Concepts and Spatial Thinking	Geometry and Measurement
11	Statistics and Variability	Graphs, Effects of Scale Changes	Geometry: Solids, Circles, and Transformations	Congruence, Similarity, and Transformations	Graphing Linear Equations and Inequalities
12	Real Numbers in Formulas	Types of graphs (bar, box and whiskers, circle)	Counting and Probability	Measurements in Geometry	Polynomials
13		Probability		Exploring Linear Equations	
14				Exploring Data and Polynomials	

Instruments

This section describes the teacher and student instruments used in the study. Teacher instruments are included in Appendix C; student instruments, except for the standardized tests, are included in Appendix D.

Teacher Instruments

Teacher Script for Students. All teachers, both UCSMP and comparison, were provided a script to share basic information about the study with their students.

Teacher Questionnaire #1 (Initial). The initial teacher questionnaire, completed both by UCSMP and comparison teachers, was designed to collect teacher demographics as well as baseline data about classroom details and instructional approaches. In addition to collecting information about degrees, certification levels, years teaching, number of class minutes per day, expected challenges during the year, or questions about the proposed study, teachers were queried about their plans for the school year, with some questions adapted from Weiss, Banilower, McMahon, and Smith (2001). In particular, teachers were asked about the importance of specific plans to their teaching, such as their plans to have students read, write, or learn concepts or skills. In addition, teachers were queried about the frequency of proposed plans.

Teacher End-of-Year Questionnaire. This questionnaire was administered to UCSMP and comparison teachers near the end of the school year. Teachers were queried about their instructional time spent on particular class arrangements and on lesson activities, the frequency and use of particular reading and writing strategies, the frequency and type of calculator usage, opinions about the textbook, and any content needing additional teacher support. The items about importance and frequency asked on the initial questionnaire about *plans* for instruction were repeated on the final questionnaire about *actual* instruction.

Teacher Interview Protocols 1 and 2. In conjunction with school visits, both UCSMP and comparison teachers were each interviewed for about 30-45 minutes. Two schools were visited in the fall in an early attempt to determine how the study was going; teachers at those two schools were interviewed using protocol 1. Minor revisions to the protocol were made and subsequent interviews were conducted using protocol 2. The interviews were an opportunity to clarify and confirm information from the initial school study application, determine the extent to which the observed classroom instruction was typical, and have teachers discuss issues about expectations for content, reading, writing, and technology in more depth. Those teachers who had previously taught from *Transition Mathematics* (Second Edition) were also interviewed about changes from the Second to the Third Edition. Table 3 aligns questions, as appropriate, to comparable items on the initial or final questionnaires and the teacher interviews. Thus, the interviews provide a means of triangulation with other data sources.

Table 3. Alignment of Items about Instructional Actions on Initial and Final Teacher Questionnaires and Teacher Interview

Category	Importance		Frequency of Use		Interview Protocol 2 No.
	Initial Item No.	Final Item No.	Initial Item No.	Final Item No.	
Increase students' interest in mathematics	6a	16a			
Learning of skills/procedures	6c, 6ℓ	16c, 16ℓ			
Learning of concepts	6b	16b			
Learning about connections	6h	16h	7m	17m	
Problem solving	6f	16f			
Reasoning	6g, 6j	16g, 16j			
Reading mathematics	6d, 6e	12, 16d, 16e		10, 11	7a
Writing/explaining mathematics	6k	15, 16k	7e, 7i, 7o	13, 14, 17e, 17i, 17o	7b
Calculator technology	6n	8, 9, 16n		7	6a-f
Computer technology	6o	16o			
Future study or assessments	6i, 6m	16i, 16m			
Type of lesson presentation			7a, 7c	3, 17a, 17c	
Type of student grouping			7d, 7f	2, 17d, 17f	7d
Types of questions			7b, 7h, 7j	17b, 17h, 17j	
Alternate solutions/representations			7k, 7ℓ	17k, 17ℓ	
Hands-on materials			7g	17g	7e
Assignment of homework			7n	5, 17n	

Guidelines for Classroom Visits. No specific observation protocol was used for classroom visits. Rather, the study used an ethnographic approach by simply taking field notes of what occurred during and as part of lesson instruction. However, the arrangement of desks as well as obvious student demographics (e.g., number, gender, ethnicity) were recorded regularly.

Transition Mathematics Chapter Evaluation Forms. All *Transition Mathematics* teachers were asked to complete a Chapter Evaluation Form for each chapter taught, in which they indicated the lessons taught and the questions assigned. In addition, teachers rated each lesson and question set on a scale from 1 to 5:

- 1: Disastrous; scrap entirely
- 2: Poor; needs major rewrite
- 3: OK; some big changes needed
- 4: Good; minor changes needed
- 5: Excellent; leave as is.

For each chapter, teachers also were queried about the use of the Teacher Notes and Chapter Test, the use of supplementary materials, and the use of calculator or computer technology. Most questions were consistent on the form from chapter to chapter. However, some questions were specific to a given chapter to determine views on a given approach or technique or to request commentary about changes made from the Second Edition to the Third Edition. (Only the Chapter Evaluation Form from Chapter 1 is included in Appendix C.) Information from these forms helps the reader understand achievement differences based on potential implementation differences; also, the curriculum developers used the teachers' input on these forms to modify the Field-Trial Version prior to commercial publication.

Comparison Textbook Chapter Coverage Form. For each chapter they taught, comparison teachers were asked to record the lesson and the questions assigned. In addition, teachers indicated whether they used calculator or computer technology with the chapter, and if so, how. Teachers reported whether they used the chapter test accompanying their materials. The teacher who created her own curriculum materials completed this form for each unit taught, indicating the major content focus and the source of any materials (e.g., teacher resource books or lessons from another textbook such as *Transition Mathematics*, Second Edition).

Directions for Administering Pretests, Posttests, and the Student Information Form. Specific directions were written to instruct teachers on administration of the pretests, posttests, and student information form. On these forms, teachers indicated when they administered the given forms.

Teacher Opportunity-to-Learn (OTL) Form. This form is designed to provide information on the extent to which the content on the posttests was actually taught. Rather than simply use lesson coverage forms, insight is obtained on the content on an item-by-item basis, from the perspective of the classroom teacher. Thus, the teacher is able to indicate coverage, not only in terms of content but also potentially in terms of approach; that is, a teacher might have taught a particular concept from only a skills perspective and believe that an application item about the concept is not appropriate for his or her students.

The OTL form is based on forms used in international studies (Burstein, 1992). For each item on all three posttests, teachers responded to the following two questions:

1. During this school year, did you teach or review the mathematics needed for your students to answer this item correctly?
   a. Yes, it is part of the text I used.
   b. Yes, although it is not part of the text I used.
   c. No, because it is not part of the text I used.
   d. No, although it is part of the text I used.
2. If your students take a state assessment at the grade level in which this course is being taught, is the content addressed by this item tested on the state assessment?
   a. Yes
   b. No

Student Instruments

Terra Nova CAT Survey 17C (Pretest). This standardized 32-item multiple-choice test (CTB McGraw-Hill, 2001) is designed for students in grades 6.6 through 8.2 (where grade *x.y* refers to the *y*th month of grade *x* with September being month 0). An analysis of the content by the UCSMP Secondary Director of Evaluation suggested a good fit with the expected prerequisite knowledge for *Transition Mathematics* or its equivalent. Students were provided with a punch-out ruler, but were not permitted to use calculators on any portion of the test. In accord with the testing directions, students were given 10 minutes to complete items 1-9. Four of these first nine items are non-contextual skill problems involving decimal multiplication or division, fraction subtraction, and percent computations; the other five involve arithmetic computations with decimals or whole numbers set in real contexts. Students were then given 30 minutes to complete items 10-32. Among these 23 items, 15 are set in a real context; 4 of the 8 non-contextual problems address geometric concepts. Among the 32 items, 15 deal with number concepts, 4 with algebraic ideas or patterns, 4 with geometric concepts, 4 with measurement, and 5 with data analysis or probability, including understanding graphs and tables. Norming data is available for both Fall and Spring administrations of the test. Using just students in the final sample (e.g., those who took all tests and remained in the same class with the same teacher), this test has a Cronbach alpha of $\alpha = 0.831$.

Middle School Mathematics Test (Pretest). This 28-item multiple choice test was developed by project staff at UCSMP to assess additional content for which baseline data was desired; calculators were not permitted. Items were developed to provide information about four major sub-topic areas: variables and their uses – 7 items; solving equations or inequalities – 7 items; measurement, including perimeter, area, volume – 10 items; and transformations – 4 items. Among these items, 7 focus on Skills, 4 on Properties, 7 on Uses, and 10 on Representations. Twelve of the items were identical to or adapted from Grade 8 released items from the National Assessment of Educational Progress (NAEP)[4]; five of the items had previously been used in the UCSMP *Transition Mathematics* (Second Edition) evaluation study; ten of the items were new for this study. For the students in the final sample, this test has a Cronbach alpha of $\alpha = 0.749$. See Appendix D.

Iowa Algebra Aptitude Test: Form 1 Fourth Edition (Posttest). This standardized test (Schoen & Ansley, 1993a) assesses readiness for algebra. According to the administration manual, the content addresses current recommendations related to the algebra curriculum in terms of "(1) symbolism and language; (2) applications and uses of algebra; (3) functions, especially in tabular form; (4) graphing and the interpretation of graphs; (5) emphasis on problem solving; (6) deemphasis of computation; and (7) use of cognitive research in algebra to guide test construction" (Schoen & Ansley, 1993b, p. 2). The 63 items are divided into four parts, with norming data available for each part and for the test as a whole:

- Part A: *Interpreting Mathematical Information* consists of 18 items focusing on interpreting graphs and comprehending a reading passage about a novel mathematical situation – 10 minutes;
- Part B: *Translating to Symbols* consists of 15 items focusing on translating applications to the appropriate numerical or variable expression – 8 minutes;
- Part C: *Finding Relationships* consists of 15 items focusing on finding rules to describe

[4] Released NAEP questions are available at http:nces.ed.gov/nationsreportcard/itmrlsx/search.aspx

relationships in tables – 8 minutes;

- Part D: *Using Symbols* consists of 15 items focusing on solving algebraic expressions and identifying relationships among variables – 10 minutes.

Running a Cronbach alpha on the test results using students in the final sample yields $\alpha = 0.780$ for Part A, $\alpha = 0.718$ for Part B, $\alpha = 0.830$ for Part C, $\alpha = 0.761$ for Part D, and $\alpha = 0.915$ for the entire test, which are consistent with those in the technical manual (Schoen & Ansley, 1993b).

Algebra/Geometry Readiness Test: Part One (Posttest). This 40-item multiple-choice test was developed by UCSMP project staff; calculators were not permitted. Among the 40 items, 24 were repeated from the *Middle School Mathematics Test* (i.e., the pretest), in order to assess growth over the course of the year. Items were developed to address several subtest areas: variables and their uses – 6 items; equations and inequalities – 8 items; measurement, including perimeter, area, and volume – 10 items; transformations and symmetry – 3 items; geometric figures and their properties – 7 items; and arithmetic operations – 6 items. Among the items, 9 address Skills, 6 address Properties, 10 address Uses, and 15 address Representations. Fifteen of the items were identical to or adapted from Grade 8 released NAEP items, 10 were from Grade 8 released items on the Third International Mathematics and Science Study (TIMSS 1999 or 2003), 5 had been used on the *Transition Mathematics* (Second Edition) evaluation study, and 10 were new. For the students in the final sample, this test has a Cronbach alpha of $\alpha = 0.860$. See Appendix D.

Algebra/Geometry Readiness Test: Part Two (Posttest). This 12-item constructed response test was developed by UCSMP project staff; calculators were permitted on the test and students were asked to indicate the model of calculator available and whether or not it could graph equations. Seven of the items were identical to or adapted from released Grade 8 items on TIMSS 1999, 2 were from Grade 8 released items on NAEP, 2 were adapted from the *Transition Mathematics* (Second Edition) evaluation study, and 1 was new. Five items were each worth one point, five were each worth two points, one was worth three points, and one was worth four points. The maximum score across the 12 items was 22. For the students in the final sample, the Cronbach alpha for the test was $\alpha = 0.771$. See Appendix D.

Rubrics and procedures were developed for scoring these constructed-response items (see Appendix E) using methods applied in studies by Malone, Douglas, Kissane, and Mortlock (1980), Senk (1989), and Thompson and Senk (1993). For those items from the TIMSS and NAEP, the rubrics used in those assessments were applied in scoring the items on the *Algebra/Geometry Readiness Test: Part Two*. In addition to scoring the items, codes were applied to identify the type of solution or error embodied in the response.

When scoring the constructed response items, papers from classes and schools were mixed together. Anchor papers were used to train raters in using the rubrics. Each student response was scored and coded independently and blindly by two raters, and raters had no knowledge of the school, class, or curriculum connected to the response or of the score obtained on previous items. When the two raters did not agree, a third rater resolved the discrepancy. Percent agreement was better than 95% on the scoring of all responses; agreement was better than 90% on identifying appropriate codes for responses with the exception of item 8b (88%) and item 9 (89%). These high reliabilities likely reflect the fact that items were generally scored as correct or not, and there was not much in the way of explanation needed for most items.

Table 4 indicates the chapter in *Transition Mathematics* (Third Edition) in which the content for each of the items on the three posttests is taught.

Table 4. Chapter in *Transition Mathematics* (Third Edition, Field-Trial Version) in which the Content for the Posttest Items is Taught

Chapter	Chapter Title	*Iowa Algebra Aptitude Test*	*Algebra/Geometry Readiness Test: Part One*	*Algebra/Geometry Readiness Test: Part Two*
1	*Reading and Writing Numbers*	1A, 2A 9D, 10D	39	7
2	*Representing Numbers*		2, 27	1, 2
3	*Using Variables*	8A, 9A, 10A, 11A, 12A 2B, 3B, 5B, 8B 1C, 2C, 3C, 4C, 5C, 6C, 7C, 8C	9, 13, 18, 37	5, 10, 12
4	*Representing Sets of Numbers and Shapes*		16, 23	
5	*Patterns Leading to Addition and Subtraction*	3A, 4A, 6A, 7A 1B, 15B 11D, 13D, 14D	12, 14	
6	*Some Important Geometry Ideas*		10, 15, 17, 19, 20, 24, 26, 28, 36	
7	*Multiplication in Geometry*		6, 11, 21, 22, 30, 32, 33, 34, 38	3, 6, 11
8	*Multiplication in Algebra*	4B, 6B, 7B, 13B, 14B 12D	3, 5, 7, 29	9
9	*Patterns Leading to Division*	9B, 11B, 12B 4D, 15D	4, 35, 40	
10	*Linear Equations and Inequalities*	10B 9C, 10C, 11C, 12C, 13C, 14C, 15C 1D, 2D, 3D, 5D, 6D, 7D, 8D	1, 25, 31	4,8
11	*Statistics and Variability*		8	
12	*Real Numbers in Formulas*	5A, 13A, 14A, 15A, 16A, 17A, 18A		

Note: For the *Iowa Algebra Aptitude Test*, 1A indicates item 1 on Part A, 1B indicates item 1 on Part B, and so forth. Correlations to chapter content were completed by one of the editorial assistants working on *Transition Mathematics*.

Middle School Mathematics: Student Information Form. This student survey was administered near the end of the school year to determine students' perspectives on a number of instructional strategies; UCSMP recommended that this survey form be administered on the same day as the *Algebra/Geometry Readiness Test: Part Two*. In particular, students were queried about the amount of time they spent on homework, issues about reading and writing similar to those on the teacher questionnaire, and the frequency and use of calculator technology

in class and for homework. Responses from the student survey and the teacher questionnaire provide a means to compare data to determine any major discrepancies. See Appendix D.

Because of IRB requirements, it was not possible to collect student names on this form. However, researchers desired to identify responses primarily from students who were in the class for the entire school year under the assumption that these responses would be from those students who completed all testing instruments and would be in the final sample. The first two questions ask if students were in the class at the beginning of the year and at the time of the first report card; summary results are reported in Chapters 3 and 5 for only those students who responded affirmatively to both these questions.

The Sample

Six schools in six states participated in the study. Two groups of students comprise the sample: students in the Case Study schools and students in the Matched Pairs Study. The former consists of a group of advanced sixth-grade students in five classes in two schools. The latter consists of a group of eight matched pairs of seventh-grade students in four schools.

Description of Schools in the Case Study

School 02. This small school, with a population of about 310 students, is located in a suburban area. The student population is essentially all White. Students had previously studied from UCSMP *Everyday Mathematics* in K-6. However, for this honors group of sixth grade students at stanines 7, 8, or 9, the teacher was concerned that *Everyday Mathematics: Grade 6* was not challenging enough. The teacher perceived that *Transition Mathematics* would offer challenge while also giving students needed basic skills. Students who finished *Transition Mathematics* would be expected to take a traditional prealgebra course in seventh grade.

School 04. This middle school, with grades 6 through 8, has a population of slightly more than 800 students in a suburban environment. The school district is about 92% White and 7% Black. The district has been a long-time user of UCSMP materials, from kindergarten through grade 12, and has had considerable success with the program. Participating students were medium high to high achieving sixth graders. At this particular school, all sixth grade students except those with learning support were studying from *Transition Mathematics* (Second Edition), with advanced students completing the text in one year and regular students completing the course in one and a half years. Whenever students completed *Transition Mathematics*, they began UCSMP *Algebra*. Thus, regular students completed *Algebra* by the end of eighth grade, with the advanced students actually completing *Algebra* in seventh grade and then *Geometry* in eighth grade. Because all information about the study needed to be completed within one school year to inform potential revisions during the summer of 2006, only the advanced sixth grade students were invited to participate in the study. Students were in the advanced class based on a district pretest administered in fifth grade, results from the state standardized test, and teacher recommendations.

Description of Schools in the Matched Pairs Study

School 03. This middle school, with grades 6 through 8, has a population of slightly more than 500 students drawn from a large geographic region. The school application identified the student population as 50% White, 30% Black, 15% Hispanic or Latino, and 5% Asian and the geographic region as 30% city, 30% suburban, 25% small town, and 15% rural. The district had

been using UCSMP from *Everyday Mathematics K-6* through *Advanced Algebra*, so students and teachers had previously been using *Transition Mathematics* (Second Edition). Classes were heterogeneous with all ability levels, low to high; all seventh-grade students took the same course, with the expectation that most would take UCSMP *Algebra* in eighth grade. However, the school used a teaming approach; the team taught by the UCSMP teacher had the special education students and the team taught by the comparison teacher had the gifted students and English Language Learners. As described in the section on Instructional Materials, the school was planning to pilot *Connected Mathematics* in the comparison classes, but difficulties with receipt of the materials resulted in the comparison teacher ultimately creating her own materials. Although the two teachers were not randomly assigned to classes, seventh-grade students were randomly assigned to classes by the computer; the comparison classes had a student teacher from January until the beginning of March.

School 05. This small K-12 school has a population of roughly 275 in grades K-8 and 115 in grades 9-12 in a rural environment. The school application indicated the entire school population as minority, with many students attending the school throughout their educational experience. The high school had previously used UCSMP *Transition Mathematics* (Second Edition) through *Precalculus and Discrete Mathematics* (Second Edition). Study classes consisted of heterogeneously grouped seventh grade students, with ability levels from low to high. Although the two teachers were not randomly assigned, the students were randomly assigned to classes.

The high school had *Transition Mathematics* in the ninth grade and eventually wanted to make prealgebra the lowest level course at that grade. Eventually the school planned to offer *Pre-Transition Mathematics* at the seventh grade, *Transition Mathematics* at the eighth grade, and *Algebra* at the ninth grade. Although school personnel did not expect many of their seventh-grade students to be currently ready for *Transition Mathematics*, they wanted to use the field-study to determine what students were able to do. Based on mathematics work with the students from elementary grades, they expected about half of the students in the seventh-grade classes would struggle with the content and need to retake *Transition Mathematics* the next year, with the other half being ready to take *Algebra* in the eighth grade.

School 06. This middle school, serving grades 6 through 8, has a population of slightly more than 850 in a suburban environment. The school application indicated the population as 75% White, 5% Black, 9% Hispanic or Latino, and 9% Asian. The district was using UCSMP *Everyday Mathematics* in grades K-6, but no secondary UCSMP materials; so, this school was actively recruited by UCSMP to participate in the *Transition Mathematics* field study. Seventh-grade students were divided into high and low groups, based on past test scores and teacher recommendations, with the high students (about 50%) assigned to prealgebra (i.e., the equivalent of *Transition Mathematics*); these students would be expected to take *Algebra* in eighth grade. Once the prealgebra students had been identified, they were assigned to classes randomly. In addition, the four seventh grade teachers' names were placed in a hat, with school personnel drawing two to be the UCSMP teachers and the other two to be the comparison teachers.

School 07. This city middle school, serving only grades 7 and 8, has a population of around 1400 students. According to the school application, the student population was 84% White, 13% Hispanic or Latino, and 3% Asian. The district had been using UCSMP *Everyday Mathematics K-6*, so UCSMP actively recruited the district to find a school interested in participating in the *Transition Mathematics* field study. Students were in seventh grade, with the exception of one sixth grade student, and were considered as on grade level; students had been placed in the prealgebra sections based on teacher recommendations and test scores in grades 5 and 6. Most

students completing *Transition Mathematics* or a comparison prealgebra course would be expected to take Introduction to Algebra in the eighth grade, although those with an A in the seventh grade course might take Algebra instead. Although teachers were not randomly assigned to classes, students taking prealgebra were randomly assigned to UCSMP or comparison classes.

Characteristics of the Teachers

Table 5 (pp. 30-31) reports the background characteristics of the UCSMP and comparison teachers in the study. Both of the sixth grade teachers in the Case Study were female, with mathematics certification, and appeared to be comparable in number of years teaching to the middle school teachers in the 2000 *National Survey of Science and Mathematics Education* (Weiss, Banilower, McMahon, & Smith, 2001). The sixth-grade teacher at School 02 had not previously taught from *Transition Mathematics* nor had she taught the course in which *Transition Mathematics* was being used.

Among the seventh grade teachers in the Matched Pairs Study, three of the UCSMP teachers were male and two were female; all five comparison teachers were female. The UCSMP teacher at School 03 and the UCSMP and comparison teachers at School 06 did not have specific mathematics certification, but had elementary K-8 or K-9 certification. Among the seventh-grade teachers, the mean number of years teaching was 9.3 years (s.d. = 6.0) for the UCSMP teachers and 10.2 years (s.d. = 4.9) for the comparison teachers. So, these teachers seem to have slightly less teaching experience than middle school teachers in the *2000 National Survey of Science and Mathematics Education* (Weiss, Banilower, McMahon, & Smith, 2001) in which 24% had taught 11-20 years and 32% had taught 21 or more years.

Three of the seventh-grade teachers, one of whom was serving as a comparison teacher, had previously taught from UCSMP *Transition Mathematics* (Second Edition). All the UCSMP teachers, except for the teacher at School 05, had previously taught the course in which *Transition Mathematics* was being field-tested; among the comparison teachers, two had previously taught the course involved in the study.

At Schools 05 and 07, there was wide variability in the experience level of the teachers, with the UCSMP teacher having more experience at School 05 and the comparison teacher having more experience at School 07. At School 06, one of the UCSMP teachers had considerably less experience than the other three teachers; in addition, this teacher was pregnant during the school year and missed a significant number of days during the second semester.

Characteristics of the Students

Gender. Table 6 records the gender of the students in the two groups. At sixth grade, there were approximately half as many girls as boys in the classes at both schools. At seventh grade, the numbers of boys and girls were fairly balanced in the *Transition Mathematics* classes. However, in the comparison classes at Schools 03 and 06, there were about 50-60% more girls than boys, and in School 05 there were three times as many girls as boys.

Table 6. Gender of Students in Case Study and Matched Pairs Study by School

School	*Transition Mathematics*		Comparison	
	Male	Female	Male	Female
Grade 6 Case Study				
02	20	9		
04	42	24		
Matched Pairs Study				
03	28	26	25	41
05	4	3	2	6
06	23	28	17	25
07	16	14	12	14

Comparability of Groups. As indicated in the section on School-Year Procedures, classes were matched on the basis of two pretests: the *TerraNova CAT Survey: Form 17* (a standardized measure); and the UCSMP developed *Middle School Mathematics Test*. On the *TerraNova*, fall norm data were used to estimate the percentile ranking of each class, with grade 6 norms used for classes at Schools 02 and 04 and grade 7 norms used for classes at all other schools.

Table 7 reports the class means for the *TerraNova Test*; Table 8 reports the class means for the *Middle School Mathematics Test*.[5] Results in both tables are only for those students who took both pretests, all three posttests, and stayed in the same class with the same teacher throughout the year; these students and classes comprise the final sample. Figures 1 and 2 illustrate boxplots of the scores on the *TerraNova Test* and the *Middle School Mathematics Test*, respectively, for the case study classes and the matched pairs study classes.

The results in Tables 7 and 8 clearly suggest, as might be expected, that the sixth-grade students taking *Transition Mathematics* are at a higher achievement level than the seventh-grade students taking the course. Mean scores of sixth-grade students were between the 87th and 93rd percentiles on the standardized test, using grade 6 norms. In contrast, mean scores of seventh-grade students ranged from the 19th to the 80th percentiles using grade 7 norms; within a given school, the percentiles tended to be relatively comparable across classes, with 10% being the maximum percentile difference between classes in a given pair. Pretest results at School 05 are the lowest in the study for both classes.

Testing the difference in the means of the matched pairs for the seventh grade indicates so significant difference in prerequisite knowledge based on curriculum. On the *TerraNova*, the overall difference in the means is less than a tenth of a point, and the effect size is about 0.02 of a standard deviation. On the UCSMP-constructed pretest, the overall difference in the means is about two tenths of a point, in favor of the comparison students, with the effect size less than 0.1 of a standard deviation. Hence, for all practical purposes, the students in the two sets of curriculum are comparable.

The score distributions in Figures 1 and 2 highlight the variability within and across classes. There is less variability within the five classes in the Case Study than in the classes in the Matched Pairs Study. At Schools 06 and 07, achievement levels within a class are much closer than they are at Schools 03 and 05; these results are likely a reflection of the fact that at Schools 06 and 07 only advanced students took the equivalent of prealgebra while at Schools 03 and 05 almost all students at grade 7 were taking the given course.

[5] Results for School 07, class 024, which used UCSMP *Transition Mathematics*, are reported in Appendix F. This group of seventh-grade students had no comparison class for matching purposes.

Table 5. Characteristics of UCSMP *Transition Mathematics* (Third Edition) and Comparison Teachers

School	Teacher	Gender	Background		Number of Years Teaching			
			Degrees	Certification	Prior to Current Year	At Current School	Math (*TM*)[a]	Current Course
Teachers in Grade 6 Case Study								
02	T2102U1	F	BS with major in education and minor in mathematics Masters in pastoral ministry	Elementary K-8; Mathematics 6-9	34	11	29	0
04	T2104U1	F	BS in secondary math	Mathematics 7-12, elementary K-8	14.5	13.5	13.5 (5)	5
Teachers in Matched Pairs Study								
03	T2103U1	M	Bachelor in elementary education	Elementary K-9	7	7	7 (7)	7
	T2303C1	F	BS secondary mathematics education	Mathematics 5-12	7	7	7 (2)	0
05	T2105U1	M	BS in mathematics education; MS in mathematics education	Mathematics 7-12	13	11	13 (13)	0
	T2305C1	F	BS in human development, elementary education, science	Elementary K-8; elementary/middle school science 1-9	6	6	4	2
06	T2106U1	F	BA Ed. in early childhood education	K-8	18	9	18	9
	T2106U2	F	BA in political science; MA in teaching	Generalist K-8; choral music K-12; political science K-12	5	2	4	1

School	Teacher	Gender	Background		Number of Years Teaching			
			Degrees	Certification	Prior to Current Year	At Current School	Math (*TM*)[a]	Current Course
	T2306C1	F	BA in elementary education and history; MA in curriculum and instruction	Elementary K-8	15	2	15	2
	T2306C2	F	BA in K-8 elementary and special education K-12, MA in curriculum and instruction	K-8 education; special education K-12	15	0	15	0
07	T2107U1	M	AS in mathematics and science; BS in mathematics education and human resources	Mathematics 7-12	4.5	4.5	4.5	4
	T2307C1	F	BA in liberal studies	Elementary K-8, supplementary authorization in mathematics	16	10	10	na

Note: The seven-place teacher code includes T for Teacher, 2 indicating participation in the *Transition Mathematics* study (2005-2006), a one-digit curriculum code (1 for UCSMP Third Edition, 3 for non-UCSMP comparison), a two-digit code corresponding to the school code, a U or C to indicate UCSMP or comparison, and a one-digit code to indicate the first or second UCSMP or comparison teacher in the school. So, T2102U1 indicates a Teacher participating in the *Transition Mathematics* study using the UCSMP Third Edition curriculum from School 02 who is the first UCSMP teacher in the school.

[a] A number in parentheses indicates the number of years the teacher had previously taught from *Transition Mathematics.*

Table 7. Pretest Means, by Class and Matched Pair, for the *TerraNova CAT Survey: Form 17*[a,b]

School	*Transition Mathematics*					Comparison								
	Class	*n*	mean	sd	%-tile[c]	Class	*n*	mean	sd	%-tile[c]	SE	*t*	df	*p*
Grade 6 Case Study														
02	002	17	27.71	2.39	91-93									
	003	12	27.58	2.68	91-93									
04	012	21	25.38	3.32	87-90									
	013	23	25.52	3.27	87-90									
	014	22	25.77	2.93	87-90									
Matched Pairs Study														
03	004	13	20.23	4.44	51-56	009	19	19.47	7.13	46-51	2.230	0.340	30	0.737
	005	13	20.54	7.48	51-56	010	14	18.79	5.98	41-46	2.596	0.675	25	0.506
	006	14	20.64	4.88	51-56	011	14	22.29	6.26	61-66	2.120	-0.775	26	0.445
	007	14	19.93	9.19	46-51	008	17	17.41	5.20	36-41	2.621	0.960	29	0.345
05	015	7	13.57	7.76	19-23	016	8	15.50	5.45	27-31	3.426	-0.563	13	0.583
06	019	25	22.44	3.77	61-66	021	23	22.91	4.26	61-66	1.159	-0.408	46	0.685
	020	26	23.88	3.10	66-71	022	19	23.05	4.44	66-71	1.123	0.741	43	0.463
07	025	30	24.43	4.17	71-75	026	26	25.58	3.62	75-80	1.053	-1.086	54	0.282

Note: Maximum score is 32.

[a] A dependent measures *t*-test[6] on the mean of the pair differences is not significant: $\bar{x} = 0.083, s_{\bar{x}} = 1.63, t = 0.143, p = 0.890$.

[b] The effect size between the UCSMP and non-UCSMP classes is $d = 0.024$. This value was calculated using the effect size measure for correlated observations in matched pairs as recommended by Dunlap, Cortina, Vaslow, and Burke (1996), $d = t_c[2(1 - r)/n]^{1/2}$ where d = effect size, $t_c = t$ computed using the differences between means of the matched pairs, r = correlation across pairs, and n is the number of pairs. In this case, $t_c = 0.143$, $r = 0.883$, and $n = 8$.

[c] To determine percentiles, the raw score is converted to a scale score which is then equated to a percentile. The mean fell between two raw scores, thus yielding a range of scale scores and a range of percentiles.

[6] A dependent measures *t*-test on the mean of the differences of the class means provides a method to test the overall effect of the two curricula (Gravetter & Wallnau, 1985, p. 373).

Table 8. Pretest Means, by Class and Matched Pair, for the *Middle School Mathematics Test* [a,b]

School	*Transition Mathematics*				Comparison							
	Class	*n*	mean	sd	Class	*n*	mean	sd	SE	*t*	df	*p*
Grade 6 Case Study												
02	002	17	20.12	2.87								
	003	12	21.17	2.48								
04	012	21	17.43	3.88								
	013	23	18.00	2.68								
	014	22	17.77	2.54								
Matched Pairs Study												
03	004	13	15.31	4.54	009	19	13.42	5.39	1.823	1.035	30	0.309
	005	13	15.77	5.26	010	14	13.29	5.37	2.049	1.212	25	0.237
	006	14	14.57	5.02	011	14	16.93	4.63	1.825	-1.291	26	0.208
	007	14	14.50	6.68	008	17	12.65	3.32	1.842	1.006	29	0.323
05	015	7	9.86	3.19	016	8	11.75	2.92	1.575	-1.202	13	0.251
06	019	25	15.44	3.72	021	23	16.83	4.61	1.205	-1.151	46	0.256
	020	26	16.88	3.82	022	19	17.32	3.85	1.156	-0.373	43	0.711
07	025	30	17.47	3.88	026	26	19.04	3.18	0.957	-1.643	54	0.106

Note: Maximum score is 28.

[a] A dependent measures *t*-test on the mean of the pair differences is not significant: $\bar{x} = -0.179, s_{\bar{x}} = 1.95, t = -0.259, p = 0.803$.

[b] The effect size between the UCSMP and non-UCSMP classes is d = -0.071. This value was calculated using the effect size measure for correlated observations in matched pairs as recommended by Dunlap, Cortina, Vaslow, and Burke (1996), $d = t_c[2(1 - r)/n]^{1/2}$ where d = effect size, $t_c = t$ computed using the differences between means of the matched pairs, r = correlation across pairs, and n is the number of pairs. In this case, t_c = -0.259 (p = 0.803), r = 0.703, and n = 8.

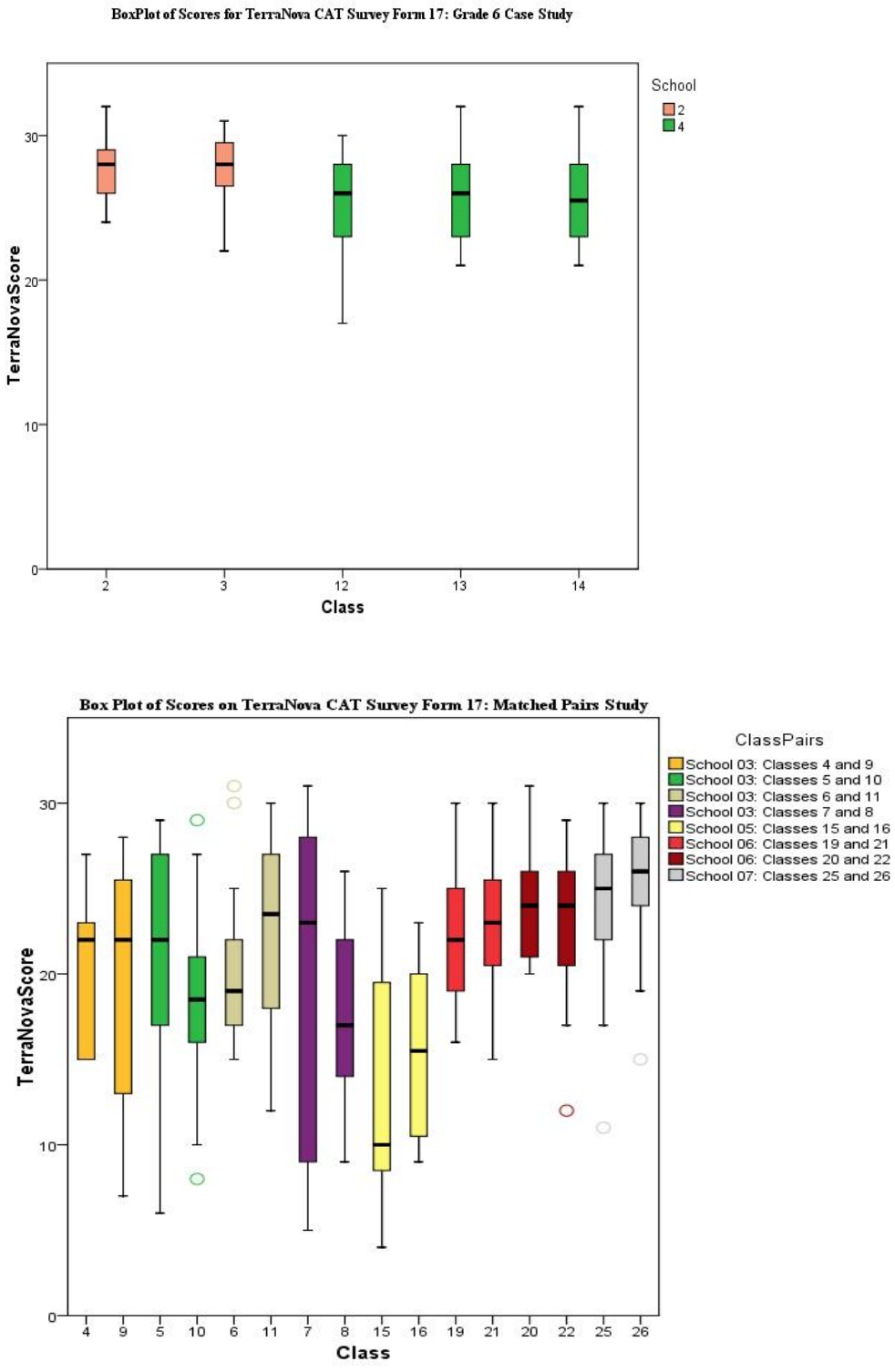
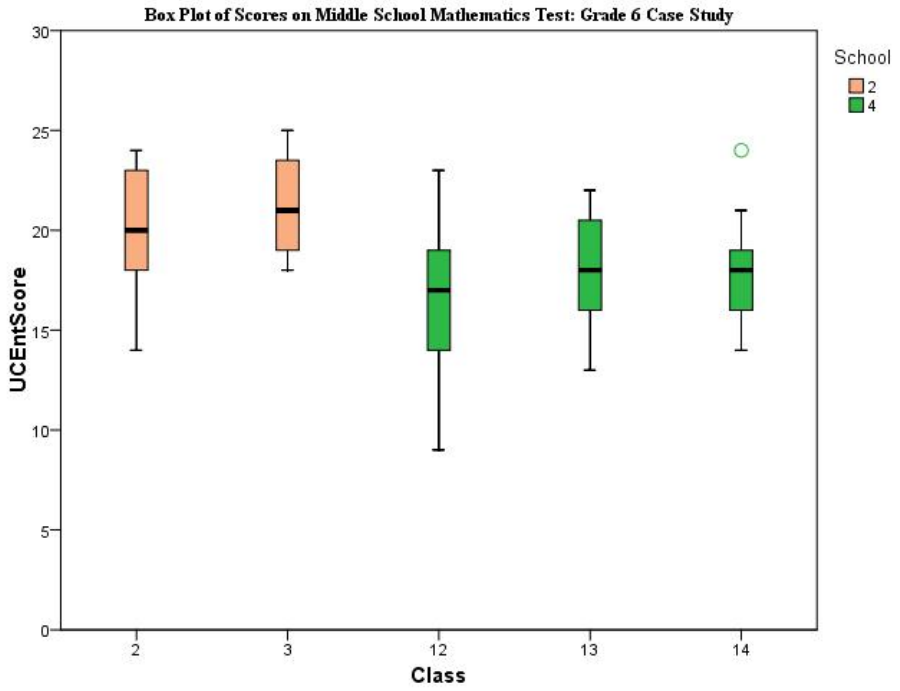


Figure 1. Box Plots of Class Scores for the *TerraNova CAT Survey*: Case Study and Matched Pair Study (max score = 32)



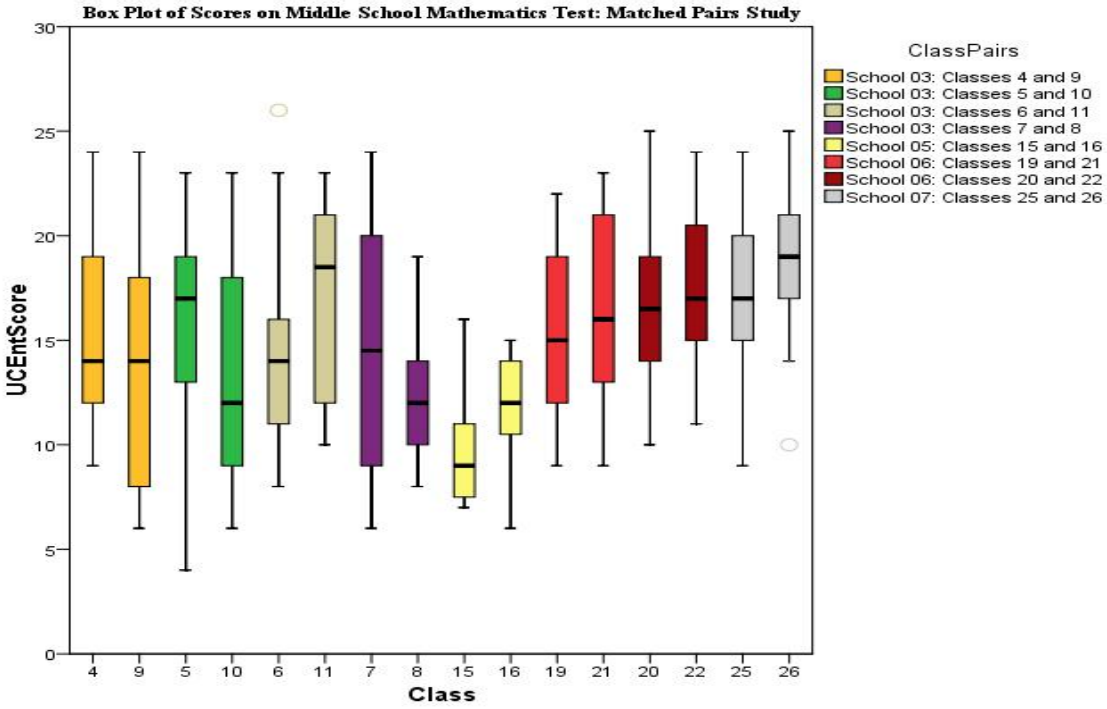


Figure 2. Box Plots of Class Scores for the *Middle School Mathematics Test*: Case Study and Matched Pair Study (max score = 28)

Chapter 3

The Implemented Curriculum and Instruction: Grade 6 Case Study

This chapter describes the implementation of the curriculum in five sixth grade classes in two schools participating in the Evaluation Study of *Transition Mathematics*. Because these students were advanced students at their grade level, there were no comparison classes and this group constitutes a case study.

The chapter contains four main sections. The first deals with students' opportunities to learn mathematics based on lesson coverage, opportunities for practice through assigned homework, expectations on posttest assessments, and teachers' goals for student learning over the course of the year. The second focuses on the classroom environment and instructional issues, including time devoted to mathematics instruction, nature and frequency of technology use, expectations for reading and writing, type and frequency of instructional activities as well as teachers' perspectives about the importance and frequency of particular student expectations. The third section focuses on the two UCSMP *Transition Mathematics* teachers' views of the Field-Trial textbook. Collectively, these sections provide data that help understand the achievement results among these students that are reported in Chapter 4. The chapter ends with a brief summary.

The results reported in this chapter come from both teachers and students. Teacher data are based on the *Teacher Questionnaires* completed at the beginning and end of the school year, the *Chapter Evaluation* forms, the teacher interviews, and classroom observations (see Appendix C for instruments). Student data are from the *Student Information Form* completed near the end of the school year (see Appendix D).

Opportunities to Learn Mathematics

Opportunities to learn mathematics depend not only on what lessons are taught, but also on what questions might be assigned for additional practice, usually at home, and on what expectations teachers have for summative assessments. Decisions about the lessons to cover are often based on teachers' goals for student learning during the year. All these aspects of opportunity to learn mathematics are discussed in this section.

Teachers' Goals for Student Learning

On the initial teacher questionnaire, teachers were asked to think about their instructional plans for their mathematics class during the upcoming year by responding to the question: "How important to you in your teaching are each of the following?" Then, on the end-of-year questionnaire, teachers responded to "How important to you in your teaching were each of the following", with responses to each item on both questionnaires rated from *of highest importance* (4) to *quite important* (3) to *somewhat important* (2) to *of little importance* (1). Table 9 reports teachers' responses to this question at both times during the year.

As Table 9 indicates, there was little difference over the course of the year in teachers' responses to the importance of particular instructional practices, such as helping students learn concepts, learn to solve problems, learn to make connections, or learn to reason mathematically. Generally, teachers rated these goals between *quite important* to *of highest importance*. Even "help students learn to perform computations with speed and accuracy" was rated as quite important, perhaps a reflection that computational fluency is an issue with which sixth-grade teachers often need to contend.

Table 9. UCSMP Teachers' Responses to the Importance of Specific Instructional Goals Based on Teacher Questionnaires: Grade 6 Case Study

Activity	Teachers			
	T2102U1[7]		T2104U1	
	Initial	End	Initial	End
Increase students' interest in mathematics	4	4	4	3
Help students learn mathematics concepts	4	4	4	4
Help students learn algorithms/procedures	4	4	4	4
Help students learn to perform computations with speed and accuracy	3	4	3	3
Help students learn to solve problems	3	4	4	4
Help students learn to reason mathematically	4	4	4	4
Help students learn how mathematics ideas connect with each other	4	4	4	3
Help students understand the logical structure of mathematics	4	4	3	4

Note: Responses were rated using the scale: *of highest importance* (4); *quite important* (3); *somewhat important* (2); and *of little importance* (1).

Discussion about teachers' goals for instruction also occurred during the interviews conducted in conjunction with the classroom observation visits. Teachers were asked the question, "What things would you most like students to learn from this course this year?" The two sixth-grade UCSMP teachers had the following goals:

- T2102U1: Strengthen skills in problem solving, reading mathematics, and understanding directions. Know operations of integers and strengthen geometry skills.
- T2104U1: Organizational skills and the ability to think [i.e., develop a strategy].

Thus, interview responses, together with the responses in Table 9, suggest that both teachers wanted to help students learn to solve problems, learn to reason, and learn to connect mathematical ideas.

Lesson Coverage

On the Chapter Evaluation Forms, teachers indicated the lessons taught within each chapter and the questions they assigned, as well as the number of days spent per lesson and chapter. Table 10 reports the chapters taught as well as the number of days spent on each chapter by these teachers, including time spent reviewing and testing. Teachers appeared to spend between 1.5 and 2 days per lesson throughout the first eight chapters.

[7] The seven-place teacher code includes T for Teacher, 2 indicating participation in the *Transition Mathematics* study (2005-2006), a one-digit curriculum code (e.g., 1 for UCSMP Third Edition), a two-digit school code, U to indicate UCSMP, and a one-digit code to indicate the first UCSMP teacher in the school.

Table 10. Number of Days Spent on Each Chapter of UCSMP *Transition Mathematics* (Third Edition), Including Testing: Grade 6 Case Study

Chapter (Number of Lessons)		Teacher	
		T2102U1	T2104U1[a]
1.	*Reading and Writing Numbers (9)*	18	15.5
2.	*Representing Numbers (7)*	11	13
3.	*Using Variables (7)*	16	15
4.	*Representing Sets of Numbers and Shapes (9)*	18	17
5.	*Patterns Leading to Addition and Subtraction (10)*	18	17
6.	*Some Important Geometry Ideas (9)*	14	15
7.	*Multiplication in Geometry (9)*	17	17
8.	*Multiplication in Algebra (10)*	21	15
9.	*Patterns Leading to Division (10)*	8	16
10.	*Linear Equations and Inequalities (8)*	8	10
11.	*Statistics and Variability (6)*	0	5[b]
12.	*Real Numbers in Formulas (6)*	0	4[b]

[a] Classes were 90 minutes long, every day.

[b] Teacher taught only the first three lessons of the chapter.

Table 11 reports the data from Table 10 in terms of the percent of the book's lessons taught, overall and by thirds of the book, as well as the percent of activities taught from those chapters that teachers completed. Because teachers could have covered comparable percentages of the book while covering very different content, the actual pattern of lesson coverage is also illustrated in Figure 3, using a display similar to those by Tarr, Chávez, Reys, and Reys (2006) in their study of curriculum enactment.

Both teachers taught all lessons in the first nine chapters and half of the lessons in Chapter 10, with Teacher T2104U1 also completing half of the lessons in the final two chapters. These teachers also had students complete the Self-Test and the SPUR Review in the complete chapters they taught; in addition, Teacher T2104U1 used the Self-Test and SPUR Review in Chapters 10 and 12 but not in Chapter 11.

Both teachers used more than four-fifths of the In-Class Activities in the chapters or portions of chapters they taught. Teachers commented about the importance of active learning and the extent to which the text encouraged them to incorporate these practices into their instruction.

> "I think the more active they are, the more resources they have when it comes time to take a test – oh, I remember when we did this. … You don't expect one [an activity] every lesson but about every four or five lessons …" [Teacher T2104U1]

Based on the lesson and chapter coverage, these teachers covered number representations, the models for the four operations, basic geometry, basic equation solving, and linear equations and inequalities and their graphs. They also incorporated the Activities, the Self-Tests, and the SPUR Reviews throughout the book.

Table 11. Percent of Lessons Taught in *Transition Mathematics* (Third Edition) Overall and by Thirds of the Book, and Percent of Activities Taught: Grade 6 Case Study

School	Teacher	Chapters (Number of Lessons[a])				Activities[b]
		Ch. 1-4 (32 lessons)	Ch. 5-8 (38 lessons)	Ch. 9-12 (30 lessons)	Ch. 1-12 (100 lessons)	
02	T2102U1	100	100	47	84	80
04	T2104U1	100	100	73	92	81

[a] Number of lessons does not include Self-Test, SPUR Chapter Review, or In-Class Activities.

[b] Percent is based only on the number of activities completed in the portions of the chapters taught. Chapters 1-12 contain a total of 17 Activities.

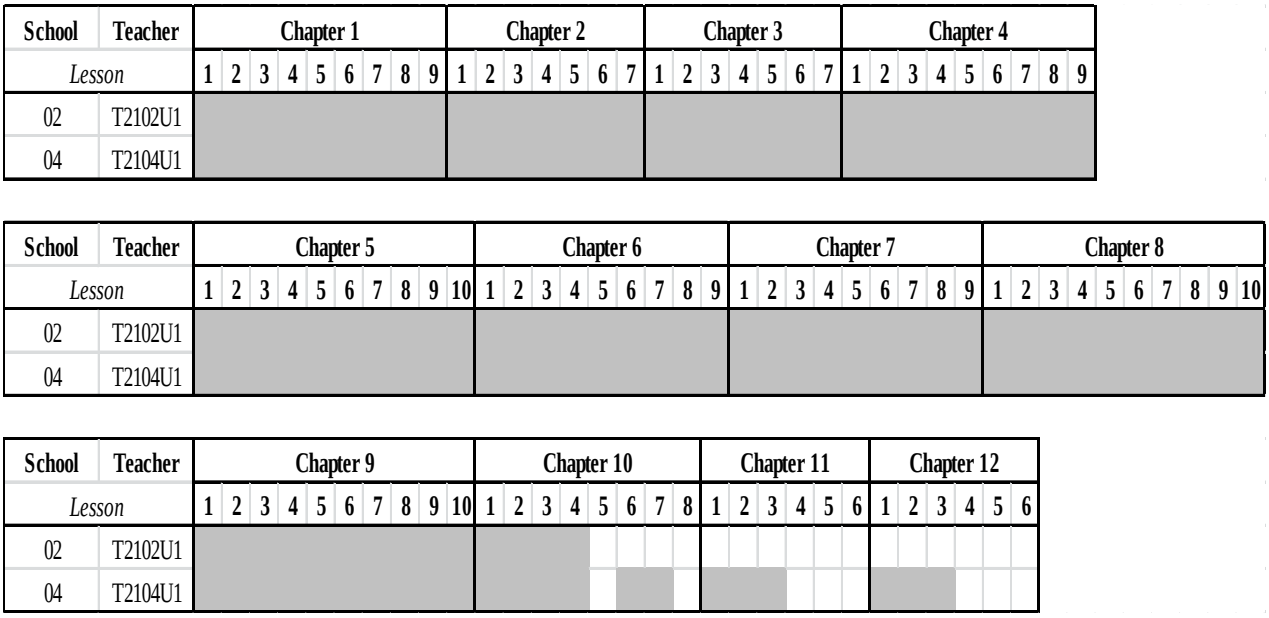


Figure 3. Pattern of Lesson Coverage in the UCSMP *Transition Mathematics* (Third Edition) Grade 6 Case Study Classes (Gray shading indicates the lesson was taught.)

Questions Assigned for Homework Practice

Table 12 reports the percent of questions assigned in each of the categories *Covering the Ideas, Applying the Mathematics*, and *Review* for the lessons teachers taught. Both teachers generally assigned the *Covering the Ideas* questions. However, while Teacher T2104U1 also assigned more than 90% of the *Applying the Mathematics* questions, Teacher T2102U1 assigned slightly less than three-fourths of these problems. Of interest is the variability in the percent of the *Review* questions that were assigned, particularly because the *Review* questions provide opportunities for student mastery of skills and concepts. Hence, omission of the opportunities for review may limit students' opportunity to develop the needed proficiency to be successful in the course and in subsequent courses. As reported in Chapter 2, the students in School 02 had quite high achievement on the pretests, so students may not have needed as much review.

Table 12. Number and Percent of Question Types Assigned by UCSMP *Transition Mathematics* Grade 6 Case Study Teachers, Based Only on Lessons Taught

School	Teacher	Covering the Ideas		Applying the Mathematics		Review		Total	
		Number	%	Number	%	Number	%	Number	%
02	T2102U1	966	94	470	73	160	27	1596	70.5
04	T2104U1	1107	98	625	91	500	78	2232	91

Note: Number represents the actual number of problems assigned of each type. The percent is determined by dividing this number by the number of possible problems in the lessons taught.

Preparation for State Assessments

The high stakes accountability of the No Child Left Behind (NCLB) legislation often puts pressure on schools and districts in relation to student achievement. Teachers were asked whether their students took a state test to meet NCLB requirements. If so, they were asked, "about how much time did you spend out of the textbook in review for this test?" and "what influenced the amount of time you spent on review (e.g., district requirements, school requirements, your experience with the requirements for the test)?"

The two sixth-grade teachers made the following responses:

- T2102U1: The teacher reported giving homework activities and using about 15 minutes of class time over a two-week period to check. Her choices for time were based on personal experience.
- T2104U1: The teacher reported reviewing for about 5 hours, with decisions based on experience with test requirements as well as vocabulary and computation review.

As might be expected for high achieving students, these teachers spent relatively little time on additional review for high-stakes assessments.

Expectations on Posttest Assessments

Table 13 reports the percent of items on each posttest for which teachers reported that students had an opportunity to learn the needed content. On the *Iowa Algebra Aptitude Test*,

there is variability in the OTL only on Parts A and D. On portions of Part A, students are expected to read a passage about unknown content and then answer questions based on the information from the reading; Teacher T2104U1 generally reported not having taught the content needed to answer these items. Likewise, on Part D one portion requires students to consider the relationship among variables and how changes in one influences changes in the others; again, on this portion, Teacher T2104U1 often reported not having taught the needed content.

Both teachers generally taught the content on the UCSMP created multiple-choice *Algebra/Geometry Readiness Test: Part One* and most of the items on the free-response *Algebra/Geometry Readiness Test: Part Two*.

The OTL responses will be used in Chapter 4 to analyze achievement results in ways that control for opportunity to learn, both at the individual school level and at the group level. Figures 4-6 illustrate the items on which the two teachers indicated that students had opportunities to learn the content on the *Iowa Algebra Aptitude Test*, the *Algebra/Geometry Readiness Test: Part One*, and the *Algebra/Geometry Readiness Test: Part Two*, respectively. Thus, the figures provide an item-by-item picture of OTL and illustrate the extent to which the two case study teachers agreed about which items were appropriate for students at this course level.

Table 13. Percent Opportunity-to-Learn on Each Posttest as Reported by UCSMP *Transition Mathematics* Grade 6 Case Study Teachers

School	Teacher	*Iowa Algebra Aptitude Test*					*Algebra/Geometry Readiness Test*	
		Part A	Part B	Part C	Part D	Total	Part One	Part Two
02	T2102U1	39	100	100	100	83	100	92
04	T2104U1	72	100	100	47	79	93	85

School	Teacher	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18
02	T2102U1																		
04	T2104U1																		

School	Teacher	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
02	T2102U1															
04	T2104U1															

School	Teacher	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
02	T2102U1															
04	T2104U1															

School	Teacher	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15
02	T2102U1															
04	T2104U1															

Figure 4. Opportunity-to-Learn on the *Iowa Algebra Aptitude Test: Parts A-D* as Reported by Grade 6 Case Study Teachers (Gray shading indicates the item was reported as taught.)

School	Teacher	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
02	T2102U1																				
04	T2104U1																				

School	Teacher	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
02	T2102U1																				
04	T2104U1																				

Figure 5. Opportunity-to-Learn on the *Algebra/Geometry Readiness Test: Part One* as Reported by Grade 6 Case Study Teachers (Gray shading indicates the item was reported as taught.)

School	Teacher	1	2	3	4	5	6	7	8	9	10	11	12	12c
02	T2102U1													
04	T2104U1													

Figure 6. Opportunity-to-Learn on the *Algebra/Geometry Readiness Test: Part Two* (Gray shading indicates the item was reported as taught.)

Instructional Practices

This section addresses the time spent on mathematics instruction, the nature of instructional activities, particular instructional practices, expectations for homework, and the use of supplementary materials. Results are based on data from the *Teacher Questionnaires*, the *Chapter Evaluation Forms*, the teacher interviews (See Appendix C), classroom observations, and from the *Student Information Form* (see Appendix D).

Time Spent on Mathematics Instruction

Weekly time for mathematics instruction was 50 minutes per day at School 02 but 90 minutes per day at School 04. All sixth grade students at School 04 met for this longer time period, which enabled the teacher to engage in a variety of activities, including time in class to work on problems, and still cover 81% of the UCSMP *Transition Mathematics* textbook with these advanced students.

Instructional Activities

At the beginning of the school year, teachers were asked to think about plans for their class by responding to the question: "About how often do you plan to do each of the following in your mathematics instruction?" Then, at the end of the year, teachers responded to "About how often did you do each of the following in your mathematics instruction", with responses rated from *almost all lessons* (4) to *often* (3) to *sometimes* (2) to *almost never* (1). In addition, teachers indicated the percent of each week in which students engaged in instruction within whole class, small groups, or independent seatwork and to indicate the percent of time in a typical lesson spent on warm ups, homework review, lesson introduction, or classroom management. Together, these questions provide insight from the teachers about their instructional practices over the course of the year. Table 14 reports teachers' responses to the frequency of various instructional activities. Responses to these questions can be compared to teachers' reported percentages of time spent in particular instructional arrangements (Table 15) and on particular lesson activities (Table 16).

As Table 14 indicates, teachers reported engaging students in whole class discussions in *almost all* lessons, with small group work also occurring *often*. These ratings are consistent with the results in Table 15, in which teachers reported engaging students in whole class instruction or small cooperative groups 70-100% of the time. Teacher T2104U1 commented on the need to engage students in a variety of activities:

> "Within a day I try, it doesn't always work, that they will have to work with me, as a class group we work problems, group work and a little individual work and then that usually goes home and I assume that the rest of the individual work is done as homework. This level is great at working in groups. And they like moving. One thing that I found worked, in addition to having them grouped, is go find a friend that you think the two of you can get all these problems done. I just give them a very limited amount of time." [Teacher T2104U1]

Table 14. UCSMP Teachers' Responses to the Frequency of Specific Instructional Practices Based on Teacher Questionnaires: Grade 6 Case Study

Activity	Teacher			
	T2102U1		T2104U1	
	Initial	End	Initial	End
Engage whole class in discussions	2	4	4	4
Have students work in small groups	4	3	4	3
Introduce content through formal presentations	3	4	3	3
Have students listen and take notes	3	2	2	3
Have students use concrete materials	2	3	3	2
Pose open-ended questions	3	4	3	3
Have students use math concepts to solve applied problems	3	4	3	4
Ask students to consider alternative methods	4	3	2	2
Ask students to use multiple representations	3	3	2	2
Help students see connections	2	2	3	2

Note: Responses were rated using the scale: *almost all mathematics lessons* (4); *often* (3); *sometimes* (2); and *almost never* (1).

Table 15. UCSMP Teachers' Reported Percent of Time Each Week Spent in Various Instructional Arrangements: Grade 6 Case Study

Activity	Teacher	
	T2102U1	T2104U1
Whole class instruction	75	40
Small cooperative groups	25	30
Individual seatwork		30
Other		

Table 16. UCSMP Teachers' Reported Percent of a Typical Lesson Spent on Various Activities: Grade 6 Case Study

Activity	Teacher	
	T2102U1	T2104U1
Warm-up exercises/problems	20	15
Review of homework	20	25
Introduction of new content	60	25
Attendance, classroom management		
Other		35[a]

[a] Practice new content

Of interest to the UCSMP developers is that these teachers reported only asking students to consider alternative methods, use multiple representations, and see connections between math and other disciplines *sometimes* to *often*. Given that the UCSMP text regularly provides multiple solutions to problems, uses symbolic and graphical representations, links different mathematics topics (e.g., algebra and geometry), and connects mathematics to real world applications, it is surprising that these UCSMP teachers rated the frequency of these practices relatively low.

As the results in Table 16 indicate, these teachers spent a considerable amount of instructional time on review of homework. During school visits, the observer noted students reviewing homework with the teacher, sometimes calling out answers with students checking their own or a partner's paper and with students sharing how they obtained solutions.

Use and Frequency of Reading and Writing Strategies

All editions of *Transition Mathematics* have been written with the expectation that students *read* the textbook. The Second Edition was written with the expectation that students also learn to *write* mathematics. The Third Edition was developed to build on these expectations, with reading that would be at an appropriate level and of interest to students and with many opportunities for students to explain their thinking.

Information about reading and writing practices was obtained from multiple sources, and from both teachers and students. Taken together, information from these different sources provides confirming evidence of where the self-reported data are robust or highlight areas where responses are in conflict with each other.

One set of data comes from the queries on the beginning and end-of-year questionnaires about teachers' expectations to have students read and write mathematics. Table 17 summarizes responses from the teachers to questions about their reported plans at the beginning of the year and their reported use of reading and writing during the course of the year.

Table 17. UCSMP Teachers' Responses to the Importance and Frequency of Practices Related to Reading and Writing Based on the Questionnaires: Grade 6 Case Study

Activity	Teacher			
	T2102U1		T2104U1	
	Initial	End	Initial	End
Help students learn to read mathematics	3	3	3	3
Help students learn to read (non-textbook) mathematics related materials	3	3	3	1
Help students learn to explain ideas in mathematics effectively	3	4	3	3
Have students explain their reasoning when giving an answer	3	4	4	4
Ask students to explain concepts to one another	3	3	3	3
Have students work on extended investigations or projects	2	1	1	1
Have students write about mathematics	3	1	3	2

Note: Responses for the first three questions were rated using the scale: *of highest importance* (4); *quite important* (3); *somewhat important* (2); and *of little importance* (1). Responses for the last four were rated using the scale: *almost all mathematics lessons* (4); *often* (3); *sometimes* (2); and *almost never* (1).

These responses suggest that both sixth-grade teachers considered it to be quite important to help students learn to read their textbook. In addition, both wanted to help students explain ideas effectively and explain their reasoning when giving answers, but they generally had lower expectations about having students write about mathematics or engage in extended investigations.

As an additional means of determining the extent to which reading and writing occurred as a part of instruction, teachers were asked to indicate how often they expected students to read their textbook or write about mathematics (*every day, 2-3 times per week, 2-3 times per month, less than once a month, almost never*), to indicate the importance of reading and writing (*very, somewhat, not very*), and to indicate how often certain reading and writing practices occurred in the classroom (*daily, frequently, seldom, never*). Responses from these items were summed to create a reading and writing index for each teacher as another way to indicate their emphasis on these mathematical practices.[8] Table 18 reports these index scores for both teachers. The responses from Table 18 appear to align with those from Table 17, but with Teacher T2102U1 having a somewhat higher emphasis on reading than on writing.

Table 18. Reading and Writing Indices Reflecting UCSMP Teachers' Emphases on These Practices: Grade 6 Case Study

Activity	Teacher	
	T2102U1	T2104U1
Reading index	16	14
Writing index	10	14

Note: The maximum score on the reading index is 19 and on the writing index is 25.

The items that formed the reading and writing indices were also asked of students on the *Student Information Form* administered near the end of the school year. As indicated in Chapter 2, it was not possible to obtain student names on this form to tie responses to the students who completed all pretest and posttest instruments. However, students were asked if they were in the given class at the beginning of the school year and when they received their first report card. Responses were only analyzed for those students who responded positively to both questions, under the assumption that these students were likely to be most of those who would be in the final sample in terms of taking all instruments. Students' responses to the items forming the reading and writing indices are reported in Tables 19, 20, and 21, with the percent corresponding to the teacher response underlined to aid in comparing students' and teachers' perceptions.

[8] The reading index is based on questions 10, 11a, 11b, 11c, 11d, and 12 from the end-of-year teacher questionnaire; the writing index is based on questions 13, 14a, 14b, 14c, 14d, 14e, 14f, and 15. Responses were scored as *almost every day* (4), *2-3 times per week* (3), *2-3 times a month* (2), *less than once a month* (1), and *almost never* (0); *daily* (3), *frequently* (2), *seldom* (1), *never* (0); or *very important* (3), *somewhat important* (2), *not very important* (1).

Table 19. Distribution (by Percent) of Students in Each Class Reporting Various Reading and Writing Practices: Grade 6 Case Study

Frequency/ Level of Importance	School 02		School 04			Average
	Class		Class			
	002	003	012	013	014	
	n = 16	*n* = 12	*n* = 22	*n* = 23	*n* = 22	*n* = 95
How often did your teacher expect you to read your mathematics textbook?						
every day	88	92	77	52	41	66
2-3 times/week	13	8	18	39	55	30
2-3 times/month			5	9	5	4
< 1/month						
almost never						
How often did you actually read your textbook?						
every day	50	17	27	44	14	31
2-3 times/week	31	17	50	52	59	45
2-3 times/month	19	25	14	4	23	16
< 1/month		33	5		5	6
almost never		8	5			2
How important do you think it is to read your mathematics text if you want to understand mathematics?						
very	44	42	36	65	55	50
somewhat	50	42	46	35	46	43
not very	6	17	18			6
How important do you think it is to write about mathematics to show you understand mathematics?						
very	13	8	36	44	64	37
somewhat	38	58	50	57	36	47
not very	50	33	14			16

Notes: For each class the teacher's response to the relevant question is underlined. Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Average is based upon using student, rather than class, as the unit of analysis.

Table 20. Distribution (by Percent) of Students in Each Class Reporting on Reading Practices and Their Frequency: Grade 6 Case Study

Frequency	School 02		School 04			Average
	Class		Class			
	002 *n* = 16	003 *n* = 12	012 *n* = 22	013 *n* = 23	014 *n* = 22	*n* = 95
Teacher reads aloud in class.						
daily	56	75	96	43	18	35
frequently	44	17	4	57	73	62
seldom		8			9	3
never						
Students read aloud in class.						
daily	37	33	5		5	13
frequently	63	50	73	65	50	61
seldom		17	23	35	46	26
never						
Students read silently in class.						
daily				13		3
frequently	13	17	5	48	27	23
seldom	81	75	96	39	73	72
never	6	8				2
Students discussed the reading in class.						
daily	31	50	64	43	23	42
frequently	38	17	32	52	50	40
seldom	19	33	5	4	23	14
never	13				5	3

Note: For each class the teacher's response to the relevant question is underlined. Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Average is based upon using student, rather than class, as the unit of analysis. Teacher T2102U1 did not respond to the item about students reading silently in class.

Table 21. Distribution (by Percent) of Students in Each Class Reporting on Writing Practices and Their Frequency: Grade 6 Case Study

Frequency	School 02		School 04			Average
	Class		Class			
	002	003	012	013	014	
	n = 16	*n* = 12	*n* = 22	*n* = 23	*n* = 22	*n* = 95
Students wrote answers only.						
daily	31	25	5	4	5	12
frequently	38	67	5	26	5	23
seldom	31	8	86	57	73	57
never			5	13	14	7
Students wrote a few steps in solutions.						
daily	25	8	5	4	14	11
frequently	75	83	50	39	45	55
seldom		8	32	52	41	31
never			14	4		4
Students wrote complete solutions.						
daily	31	8	50	65	73	51
frequently	50	67	41	30	23	39
seldom	13	25	9	4	5	10
never	6					1
Students explained or justified work.						
daily	25	17	23	9	9	16
frequently	31	17	27	48	18	30
seldom	44	58	46	39	73	52
never		8	5	4		3
Students wrote in journals.						
daily	6		5			2
frequently			14	52	32	23
seldom	13		82	48	64	47
never	81	100				26
Students did a project.						
daily						
frequently				4	9	3
seldom	6		91	78	86	61
never	94	100	9	17	5	36

Note: For each class the teacher's response to the relevant question is underlined. Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Average is based upon using student, rather than class, as the unit of analysis.

As indicated in Table 19, most sixth-grade students indicated that their teacher expected them to read their textbook daily or at least 2-3 times per week; the majority of these students also reported reading at this frequency. In general, students believed it was important to read their mathematics textbook in order to understand mathematics, with about 93% indicating it is *somewhat important* or *very important*. About 84% of the students believed it *somewhat* or *very important* to write about mathematics to show understanding. Students' beliefs about the importance of reading and writing were generally in tune with their teachers' perceptions about the importance of these practices.

The results in Table 20 provide students' and teachers' perspectives on particular reading strategies used during the year. Students regularly (i.e., daily or frequently) read aloud in class, discussed the reading, or listened to the teacher read aloud. As indicated in Table 21, about 90% reported regularly writing complete solutions to problems, and slightly more than 60% reported regularly writing a few steps in problems. Less than half of the students reported writing just answers or having to explain or justify their work. Both students and teachers agreed that writing in journals or completing projects was a rare occurrence.

Comments from the teachers provide insights into their concerns about students' ability to read the textbook and how they engaged students in reading.

> "We read the notes aloud – the text aloud – in class. I don't have them read on their own, because I'm afraid they won't. … My expectation is, whether it's done or not is up to the individual student, that they go back and read that before they do the assignment, or refer to it as they're doing the assignment." [Teacher T2102U1]

> "I encourage them to read, I allow them, sometimes, to read aloud, sometimes they read it silently. They do read, but I would say that I'm probably at fault because I wasn't a math reader." [Teacher T2104U1]

During the school visits, Teacher T2102U1 engaged students in reading by having them use highlighters to mark important concepts within the lesson.[9]

Teachers also commented on writing, as noted below:

> "I do not have the students journal. … I like the idea that they can take a problem and translate it into word form. I like that idea that the *Transitions* presents terminology … and at the end of the chapter we have our vocabulary page which is really exceptional." [Teacher T2102U1]

> "[expectations for writing] Much stronger because of district pressure. That's one of our goals. We have a training once a month that's called literacy across the curriculum, and one of our monthly goals is we have a problem that the kids have to write about. And we'll come up with them in teams. What I do is I have a journal, each kid has the journal, and the problem of the day – I'll say 'today's the journal entry,' which they know as soon as I say it's a journal entry that they have to write about the answer, either through explanation or take a stand on something and present their views. So, we do include that [writing]. I have found that some of the problems in the book are excellent to use for that journal entry." [Teacher T2104U1]

[9] Schools were not expected to return the spiral-bound *Transition Mathematics* (Third Edition, Field-Trial Version) textbooks. Schools could make the decision to let students keep the books or not, so some teachers had students regularly write in the textbooks.

Overall, reading seemed to play a somewhat larger role in these sixth-grade classrooms than writing. Writing seemed to be primarily related to writing a few steps or complete solutions to problems.

Use of Technology

As indicated in Chapter 2, UCSMP *Transition Mathematics* teachers were provided graphing calculators on loan in sufficient quantities to be able to lend them to students. The sixth grade teachers chose not to lend the calculators to their students for home use, because they were concerned about the financial responsibility of lending such expensive tools to young students. In each school the students used the graphing calculators only in class. In School 02, students owned their own scientific calculators. In School 04, students could purchase or borrow a scientific calculator for the entire year.

Students were queried about their access to calculators in mathematics class. Although students were asked for the calculator model, there was some concern by UCSMP personnel that students might not be able to identify the model so they were also asked to indicate whether the calculator could graph equations. Through this question, inferences could be made about access to graphing calculators. All 95 students indicated access to calculators, but only 25 indicated access to a calculator that could graph equations; all but one of these 25 students was at School 02.

On the beginning and end-of-year teacher questionnaires, teachers were asked about the importance of helping students learn to use calculators and computers as tools for learning mathematics. In addition, on the end-of-year questionnaire, they were asked to indicate the frequency of calculator use during class instruction and how helpful the calculator technology was for student learning; because reports throughout the year indicated little computer use, teachers were not asked to indicate the frequency of use or helpfulness of computer technology. Analogous to the Reading and Writing Indices, a Technology Index was created by summing responses to two questions about the frequency and usefulness of calculator technology. Table 22 reports teachers' responses to the questions about technology use.

The results in Table 22 suggest that these sixth-grade teachers considered helping students learn to use calculators as tools to be somewhat important. Although Teacher T2102U1 also considered it important to help students learn to use computers as tools for learning mathematics, Teacher T2104U1 did not. Teachers reported using calculator technology to be very helpful during classroom instruction. Teacher T2102U1 reported having students use calculators 2-3 times per week while Teacher T2104U1 reported having students use calculators almost every day.

Table 22. UCSMP Teachers' Responses to the Importance, Frequency, and Helpfulness of Technology Based on Questionnaires: Grade 6 Case Study

Activity	Teacher			
	T2102U1		T2104U1	
	Initial	End	Initial	End
Help students learn to use a calculator as a tool for learning mathematics	3	3	3	3
Help students learn to use a computer as a tool for learning mathematics	3	3	2	1
About how often did students use calculator technology during class		3		4
How helpful was calculator technology during class		3		3
Technology Index[10]		6		7

Note: Responses for the first two questions were rated using the scale: *of highest importance* (4); *quite important* (3); *somewhat important* (2); and *of little importance* (1). Responses for the third question were rated using the scale: *almost every day* (4), *2-3 times per week* (3), *2-3 times a month* (2), *less than once a month* (1), and *almost never* (0). Responses for the last question were rated: *very helpful* (3), *somewhat helpful* (2), *not very helpful* (1). The maximum score on the Technology Index is 7.

Both teachers and students were also asked on the end-of-year questionnaire or the *Student Information Form*, respectively, to indicate how frequently calculators were used during mathematics class, how helpful they were, and for what purposes they were used. In addition, students were asked these same questions about calculators on homework. Tables 23 and 24 summarize these responses for students, with the percent corresponding to the teachers' responses to the student questions underlined.

As the results in Table 23 indicate, students generally agreed with their teachers in terms of the frequency of calculator usage in class, with usage about 2-3 times per week at School 02 and daily at School 04. As might be expected, usage for homework was slightly less frequent.

As indicated in Table 24, calculators were typically used in class for checking answers, doing computations, and solving problems as well as graphing equations and making tables. In general, students reported using calculators at home for the same purposes; however, because of the lack of graphing calculators at home, less calculator use occurred for graphing equations as part of homework.

[10] The Technology Index is the sum of the scaled responses for questions 7 and 9 from the End-of-Year Teacher Questionnaire. Responses for question 7 were rated using the scale: *almost every day* (4), *2-3 times per week* (3), *2-3 times a month* (2), *less than once a month* (1), and *almost never* (0); responses for question 9 were rated: *very helpful* (3), *somewhat helpful* (2), *not very helpful* (1).

Table 23. Distribution (by Percent) of Students in Each Class Reporting Frequency and Helpfulness of Calculator Technology: Grade 6 Case Study

Frequency/ Level of Helpfulness	School 02		School 04			Average
	Class		Class			
	002	003	012	013	014	
	n = 16	*n* = 12	*n* = 22	*n* = 23	*n* = 22	*n* = 95
About how often did you use this calculator in your mathematics class?						
every day	13	8	96	96	100	72
2-3 times/week	38	42	5	4		14
2-3 times/month	44	50				14
< 1/month						
almost never	6					1
About how often did you use a calculator for homework?						
every day	25	33	77	74	77	62
2-3 times/week	25	58	18	22	14	24
2-3 times/month	50	8	5	4		12
< 1/month						
almost never						
How helpful was the use of this calculator in learning mathematics in your mathematics class?						
very	63	42	96	96	77	79
somewhat	38	58	5	4	18	20
not very					5	1
How helpful was the use of this calculator in learning mathematics during homework?						
very	50	67	91	74	82	75
somewhat	44	33	9	26	5	21
not very	6				5	2

Note: For each class the teacher's response to the relevant question is underlined. Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Average is based upon using student, rather than class, as the unit of analysis.

Table 24. Distribution (by Percent) of Students in Each Class Reporting Use of Calculators for Various Purposes in Class and on Homework: Grade 6 Case Study

Purpose	School 02		School 04			Average
	Class		Class			
	002	003	012	013	014	
	n = 16	*n* = 12	*n* = 22	*n* = 23	*n* = 22	*n* = 95
For what did you use this calculator in your mathematics class?						
checking answers	81	100	100	100	100	97
doing computations	75	92	73	30	82	67
solving problems	94	100	96	83	91	92
graphing equations	81	92	0	4	9	28
working with a spreadsheet	38	8	9	78	100	52
making tables	44	92	9	87	77	60
analyzing data	31	75	100	91	82	79
finding equations to model data	44	92	0	4	5	21
For what did you use this calculator for homework?						
checking answers	75	92	96	96	91	91
doing computations	69	92	77	26	77	65
solving problems	94	100	91	83	86	90
graphing equations	13	8	5	4	9	7
working with a spreadsheet	6	0	9	44	73	31
making tables	19	0	9	48	64	32
analyzing data	19	17	82	65	55	53
finding equations to model data	25	33	9	9	0	13

Note: For each class the teacher's response to the relevant question is underlined. Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Average is based upon using student, rather than class, as the unit of analysis.

During the interviews and on the Chapter Evaluation Forms, teachers were queried about technology use and students' attitudes toward the use of technology. The following comments reflect some of their thoughts:

> "They [students] really appreciate using the technology. They enjoy it, and I think they like discovering different things. And, I can even give you an example – a couple of them even spoke to me about how to do absolute value on the calculator. … I think it broadens their understanding of the concept when technology is used." [Teacher T2102U1]

> [In response to how students responded to an activity using calculators to evaluate expressions.] "Great. We also made up a similar problem. The calculators can't do everything for them. They must think to arrive at a formula." [Teacher T2104U1]

> "But it's [graphing calculator] not used enough, and the kids, I'm not sure that there's been adequate learning from using it. … I'm not sure that they're ready for that kind of technology." [Teacher T2104U1]

Neither teacher reported having access to a dynamic geometry system; in addition, Teacher T2102U1 was not familiar with this technology. So, it is unlikely that lessons using such technology were implemented in the manner intended by the developers. The availability of such technology at the middle school level is an issue for future consideration.

On the End-of-Year Questionnaire, *Transition Mathematics* teachers had an opportunity to give their opinion about the textbook and its suggestions for technology. Table 25 reports their responses to these items. Generally, teachers reported that the textbook had good suggestions for the use of calculators and their features. Teacher T2102U1 reported that there were not good suggestions for table features of a calculator or the use of spreadsheets.

Both teachers would have liked some professional development related to technology, particularly graphing calculators and how to address the concepts in the book with the technology. (The *Transition Mathematics* textbook attempts to use generic language when describing calculator use, so actual step-by-step directions for the loaner calculators were not available; however, teachers did have manuals for the calculators.) Teacher T2102U1 also reported needing work on spreadsheets, and Teacher T2104U1 reported needing work on a dynamic geometry drawing tool even though the district had previously provided professional development with such software.

Table 25. *Transition Mathematics* Teachers' Responses to the Textbook's Technology Features: Grade 6 Case Study

Opinion	Teacher	
	T2102U1	T2104U1
This textbook provides good suggestions for the use of calculators.		
strongly agree/agree	X	X
no opinion		
strongly disagree/disagree		
This textbook provides good suggestions for the use of graphing features of a calculator.		
strongly agree/agree	X	X
no opinion		
strongly disagree/disagree		
This textbook provides good suggestions for the use of table features on a calculator.		
strongly agree/agree		X
no opinion		
strongly disagree/disagree	X	
This textbook provides good suggestions for the use of spreadsheets.		
strongly agree/agree		X
no opinion		
strongly disagree/disagree	X	

Homework and Frequency of Tests

On the end-of-year questionnaire, teachers were queried about the amount of time they expected their typical student to spend each day on homework; students reported the time they actually spent on homework on the *Student Information Form*. The results are summarized in Table 26, with the percent corresponding to the teachers' responses underlined. These sixth-grade teachers expected students to spend 16-30 minutes per day on homework, and this is the amount of time spent by most students at this level.

Table 26. Distribution (by Percent) of Students in Each Class Reporting Daily Time Spent on Homework: Grade 6 Case Study

Frequency	School 02		School 04			Average
	Class		Class			
	002	003	012	013	014	
	n = 16	*n* = 12	*n* = 22	*n* = 23	*n* = 22	*n* = 95
About how much time did you spend, on average, this year on your mathematics homework?						
more than 60 min/day	0	0	0	4	0	1
46-60 min/day	13	0	0	0	0	2
31-45 min/day	13	8	14	13	0	10
16-30 min/day	75	58	55	57	82	65
0-15 min/day	0	25	32	26	18	21

Note: For each class the teacher's response to the relevant question is underlined. Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Average is based upon using student, rather than class, as the unit of analysis.

Both schools used a nine-week marking period, with teachers generally administering three tests per marking period. Teachers generally used the test provided with the Teacher Notes, sometimes adding, deleting, or modifying questions to fit their needs.

Teachers' Use of Supplementary Materials

On the Chapter Evaluation Forms, UCSMP teachers regularly indicated whether they used any supplementary materials. (See Appendix G for summaries of responses by chapter.) Teacher T2102U1 used some of the home links from *Everyday Mathematics* early in the school year, particularly as this was the curriculum with which students were already familiar. Teacher T2104U1 regularly used supplementary materials, often using questions from the *Transition Mathematics* (Second Edition) Lesson Masters. This teacher's sixth-grade classes regularly met for 90 minutes per day, so the teacher had opportunities for many activities and additional practice during class.

Teachers' Perceptions about the Textbook

As previously indicated, one purpose of the evaluation study was to determine potential changes that needed to be made in the text prior to commercial publication. The Chapter Evaluation Forms were summarized for the author team during revision, and teachers regularly reported about specific aspects of the chapters or particular approaches used in a chapter. Summaries of responses to the lessons and particular features of each chapter can be found in Appendix G.

In addition to the chapter evaluations, teachers also responded to a series of questions about the textbook on the end-of-year questionnaire. Table 27 summarizes teachers' responses to these items. As the results indicate, teachers generally responded positively to the textbook and its features, but both teachers thought the textbook needed more work with skills. Both teachers would use the *Transition Mathematics* textbook again if given the choice. The comments below summarize reasons for using the textbook:

"Yes, excellent math content, concepts seem to be explained with best practices in mind and the content aligns very well with our state grade level expectations." [Teacher T2106U2]

"Yes, the 6th grade accelerated students need a challenge. I believe this 3rd Edition provides that challenge chapter after chapter." [Teacher T2104U1]

Table 27. Grade 6 Case Study Teachers' Responses to Features about the Textbook

Opinion	Teacher	
	T2102U1	T2104U1
This textbook helps develop problem-solving skills.		
strongly agree/agree	X	X
no opinion		
strongly disagree/disagree		
This textbook needs more exercises for practice of skills.		
strongly agree/agree	X	X
no opinion		
strongly disagree/disagree		
This textbook explains concepts clearly.		
strongly agree/agree	X	X
no opinion		
strongly disagree/disagree		
This textbook provides good suggestions for activities.		
strongly agree/agree	X	X
no opinion		
strongly disagree/disagree		
This textbook provides good suggestions for assignments.		
strongly agree/agree	X	X
no opinion		
strongly disagree/disagree		
This textbook needs more examples of the applications of mathematics.		
strongly agree/agree		
no opinion		
strongly disagree/disagree	X	X

Summary

Overall, UCSMP *Transition Mathematics* sixth-grade teachers in both schools implemented the curriculum materials similarly. Both teachers taught through the first half of Chapter 10. Thus, students had opportunities to study integer and rational number operations, basic geometry, basic equation solving, work with variables, and linear equations and inequalities and their graphs. Both teachers typically assigned more than 90% of the *Covering the Ideas* questions in the lessons they taught. However, Teacher T2104U1 assigned considerably more of the *Applying the Mathematics* and *Review* questions than Teacher T2102U1. Perhaps the longer daily class period (90 minutes versus 50 minutes) in School 04 enabled the teacher in this school to assign more problems, as students had time in class to work on problems.

There was not much difference between the two teachers in their plans for the year or the way they were carried out. Both teachers had more expectations for students to read their respective text than they had for students to write about mathematics. Teachers and students regularly reported using calculator technology at least 2-3 times per week, with the use primarily for checking answers, doing computations, and solving problems. Sixth-grade teachers were somewhat reluctant to lend the graphing calculators to students because of the expense. In addition, both teachers generally reported needing additional support with learning to use a graphing calculator.

Chapter 4

The Achieved Curriculum: Grade 6 Case Study

The achievement of sixth-grade students studying from UCSMP *Transition Mathematics* (Third Edition) was assessed at the end of the school year by three instruments (see Appendix D). The achievement results are presented in three main sections, corresponding to the three instruments.

Achievement on the *Iowa Algebra Aptitude Test*

The form of the *Iowa Algebra Aptitude Test* (*IAAT*) used in this study consists of 63 multiple-choice questions sectioned into four parts. National percentile scores for the *IAAT* are available, for the entire test and for each part, so the national percentile equivalents of the scores are reported to compare the achievement of students in this study to national norms. Raw score to percentile conversions are available only for integer scores and the mean raw score was not typically an integer. So, a range of percentile scores is given corresponding to the percentiles for the two integer scores bracketing the mean raw score. Results on the *IAAT* are reported for the entire test as well as for each part. To facilitate comparisons across the four parts of the *IAAT* and the entire test, scores are reported as both mean raw score and mean percent correct.[11]

Overall Achievement on the *Iowa Algebra Aptitude Test*

Table 28 reports the results on the entire *IAAT*, with Tables 29-32 then reporting the results for each of the four parts. Figure 7 uses boxplots to illustrate the range of scores, in terms of percent correct, for the five classes in the Grade 6 Case Study.

On the entire test, the mean number (and percent) of items correct by class among the Grade 6 Case Study classes varied from 50.8 (80.7%) in School 04, Class 013 to 55.1 (87.5%) in School 02, Class 002. These levels of achievement correspond to national percentiles from the 87th to the 96th percentiles, respectively. As the boxplots indicate, the range of scores was about the same for the two classes at School 02 and slightly larger for Class 013 at School 04. The lowest individual score was 63% at Class 013 in School 04, and the highest was 98% in Class 002 at School 02.

Both teachers reported teaching the content needed to answer all of the items on Parts B (translating to symbols) and C (finding relationships) of the test. However, on Part A (interpreting mathematical information), Teacher T2102U1 (School 02) taught the content for slightly more than one-third of the items while Teacher T2104U1 (School 04) taught the content for almost three-fourths of the items. In contrast, for Part D (using symbols), Teacher T2102U1 taught the content for all of the items while Teacher T2104U1 taught the content for slightly less than half of the items. Given the reported opportunity to learn (OTL), it is perhaps not surprising that achievement on Part A was the lowest among all four parts.

On the final two-thirds of Part A, students needed to read two passages of unfamiliar mathematics content and then answer questions related to that content; teachers generally reported no opportunity to learn the mathematics related to the first of these two passages. The

[11] The mean percent correct is based on a simple conversion of the raw score to the percent correct. The mean percent is not the same as the national percentile norm.

mean ranged from 12.9 (71.2%) in School 04, Class 013 to 14.3 (79.4%) in School 02, Class 002, corresponding to percentiles from the 76th to 94th percentiles, respectively.

On Part B, students had to identify a numerical or algebraic expression for a verbal problem. The mean percent correct varied from 11.7 (78.0%) in School 04, Class 013 to 13.3 (88.3%) in School 02, Class 003, corresponding to the 72nd to 98th percentiles, respectively. Overall, students seemed to be able to identify the appropriate expression to describe a verbal problem.

Part C of the *IAAT* focuses on identifying a rule to describe a relationship in a table. Students generally did quite well on this part, with the mean above 13.7 out of 15, or above 90% for all classes. That is, students were typically able to identify a rule for a pattern, a topic that is addressed quite extensively in *Transition Mathematics*.

On Part D, students needed to use algebraic relationships among variables, often evaluating or simplifying expressions. The mean ranged from 12.5 (83.5%) in School 04, Class 013 to 13.7 (91.4%) in School 02, Class 002. Again, working with expressions is a topic dealt with extensively in *Transition Mathematics*.

Overall achievement as well as the achievement on each part suggests that these advanced sixth-grade students did quite well on the *IAAT*. Thus, these sixth-grade students appear to have the necessary background for an algebra course in seventh grade.

Table 28. Mean Score, Mean Percent Correct, National Percentile, and Teachers' Reported Opportunity-to-Learn on the *Iowa Algebra Aptitude Test* by Class: Grade 6 Case Study

School	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	National Percentile	OTL%
02	002	17	55.1 (4.2)	87.5 (6.7)	95-96	82.5
	003	12	54.2 (5.1)	86.0 (8.1)	94-95	82.5
04	012	21	51.4 (4.7)	81.6 (7.4)	88-90	79.4
	013	23	50.8 (4.8)	80.7 (7.6)	87-88	79.4
	014	22	53.4 (4.5)	84.7 (7.2)	92-94	79.4
Overall Grade 6[a]		95	52.7 (4.8)	83.7 (7.7)		

Note: Maximum score is 63. To convert raw scores to standard scores and percentiles, the two integer raw scores bracketing the mean raw score were used to obtain percentile score ranges.

[a] The overall grade 6 result is based on using the student, rather than the class, as the unit of analysis.

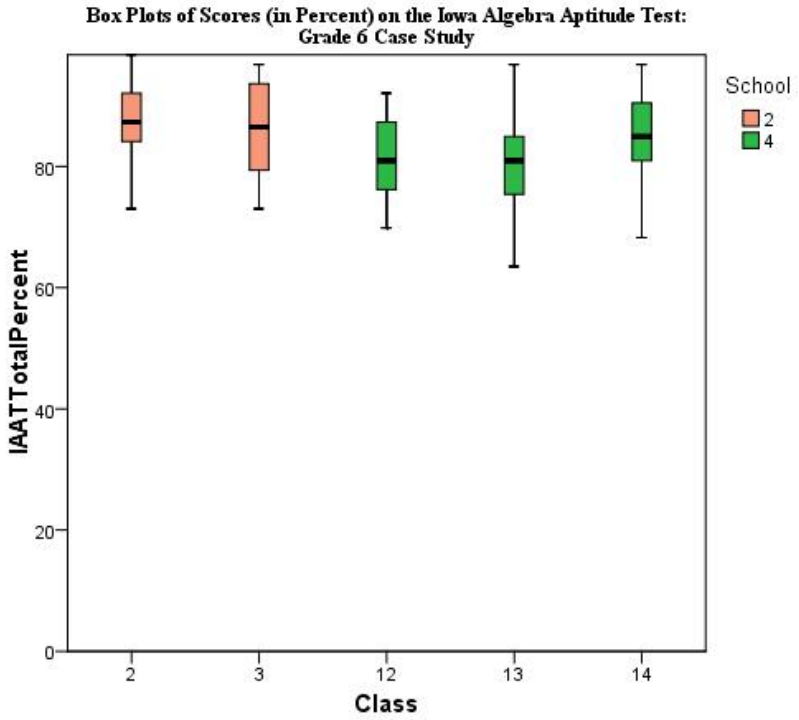


Figure 7. Box Plot of Percent Correct by Class for the *Iowa Algebra Aptitude Test*: Grade 6 Case Study

Table 29. Mean Score, Mean Percent Correct, National Percentile, and Teachers' Reported Opportunity-to-Learn on the *Iowa Algebra Aptitude Test* — Part A by Class: Grade 6 Case Study

School	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	National Percentile	OTL %
02	002	17	14.3 (2.4)	79.4 (13.3)	89-94	38.9
	003	12	13.3 (3.3)	73.6 (18.2)	83-89	38.9
04	012	21	12.8 (2.4)	71.2 (13.3)	76-83	72.2
	013	23	12.9 (2.7)	71.5 (14.7)	76-83	72.2
	014	22	14.1 (2.7)	78.5 (15.0)	89-94	72.2
Overall Grade 6[a]		95	13.5 (2.7)	74.7 (14.8)		

Note: Maximum score is 18. To convert raw scores to standard scores and percentiles, the two integer raw scores bracketing the mean raw score were used to obtain percentile score ranges.

[a] The overall grade 6 result is based on using the student, rather than the class, as the unit of analysis.

Table 30. Mean Score, Mean Percent Correct, National Percentile, and Teachers' Reported Opportunity-to-Learn on the *Iowa Algebra Aptitude Test* — Part B by Class: Grade 6 Case Study

School	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	National Percentile	OTL %
02	002	17	13.0 (1.4)	86.7 (9.4)	91	100
	003	12	13.3 (2.1)	88.3 (13.7)	91-98	100
04	012	21	11.7 (1.9)	78.1 (12.5)	72-83	100
	013	23	11.7 (1.7)	78.0 (11.4)	72-83	100
	014	22	12.4 (1.6)	82.7 (10.8)	83-91	100
Overall Grade 6[a]		95	12.3 (1.8)	82.0 (12.0)		

Note: Maximum score is 15. To convert raw scores to standard scores and percentiles, the two integer raw scores bracketing the mean raw score were used to obtain percentile score ranges.

[a] The overall grade 6 result is based on using the student, rather than the class, as the unit of analysis.

Table 31. Mean Score, Mean Percent Correct, National Percentile, and Teachers' Reported Opportunity-to-Learn on the *Iowa Algebra Aptitude Test* — Part C by Class: Grade 6 Case Study

School	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	National Percentile	OTL %
02	002	17	14.1 (1.3)	94.1 (8.8)	92-99	100
	003	12	14.0 (1.3)	93.3 (8.5)	92	100
04	012	21	13.9 (1.4)	93.0 (9.5)	85-92	100
	013	23	13.7 (1.7)	91.6 (11.6)	85-92	100
	014	22	14.1 (0.8)	93.6 (5.6)	92-99	100
Overall Grade 6[a]		95	14.0 (1.3)	93.1 (9.0)		

Note: Maximum score is 15. To convert raw scores to standard scores and percentiles, the two integer raw scores bracketing the mean raw score were used to obtain percentile score ranges.

[a] The overall grade 6 result is based on using the student, rather than the class, as the unit of analysis.

Table 32. Mean Score, Mean Percent Correct, National Percentile, and Teachers' Reported Opportunity-to-Learn on the *Iowa Algebra Aptitude Test* — Part D by Class: Grade 6 Case Study

School	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	National Percentile	OTL %
02	002	17	13.7 (1.2)	91.4 (7.7)	95-98	100
	003	12	13.7 (1.0)	91.1 (6.6)	95-98	100
04	012	21	12.9 (1.2)	86.0 (8.1)	87-95	46.7
	013	23	12.5 (1.4)	83.5 (9.4)	87-95	46.7
	014	22	12.8 (1.1)	85.2 (7.1)	87-95	46.7
Overall Grade 6[a]		95	13.0 (1.3)	86.8 (8.4)		

Note: Maximum score is 15. To convert raw scores to standard scores and percentiles, the two integer raw scores bracketing the mean raw score were used to obtain percentile score ranges.

[a] The overall grade 6 result is based on using the student, rather than the class, as the unit of analysis.

Achievement on the Fair Tests from the *Iowa Algebra Aptitude Test*

Achievement was also analyzed for a subtest consisting of only those items for which the individual teacher in the case study classes reported that students had an opportunity to learn the content needed for the items. This approach controls for opportunity to learn at the class or school level; we call this test the *Fair Test* because teachers indicated that students had a chance to learn the content needed to answer the items. Note that the *Fair Test* is unique to each school, so results are reported only as mean percent correct.

Table 33 reports the results on the *Fair Test* for the Case Study classes. As might be expected, the percentage of questions answered correctly was generally somewhat higher on the *Fair Test* than on the overall *IAAT*. The mean varied from 81% in School 04, Class 013 to 90.4% in School 02, Class 003.

Table 33. Mean Percent Correct on the Fair Tests of the *Iowa Algebra Aptitude Test* by Class: Grade 6 Case Study

School	Class	*n*	Mean Percent	s.d.
02	002	17	90.3	5.5
	003	12	90.4	6.2
04	012	21	83.0	8.3
	013	23	81.0	8.5
	014	22	86.5	8.0

Note: Items comprising each *Fair Test* are as follows: for School 02, 52 items (A1-A7, B1-B15, C1-C15, D1-D15); for School 04, 50 items (A1-A7, A13-A18, B1-B15, C1-C15, D1-D6, D8).

Achievement on the Conservative Test from the *Iowa Algebra Aptitude Test*

In addition to controlling for opportunity to learn at the school level, we also controlled for opportunity to learn at the study level by considering only those items for which both case study teachers reported that students had an opportunity to learn the needed content. We call this test the *Conservative Test*, because it assesses achievement on the intersection of the implemented curriculum for classes in the entire group. Thus, the teacher who reports covering the least amount of content strongly influences the *Conservative Test*.

Table 34 reports the results of the 44 items comprising the *Conservative Test* for the Grade 6 Case Study. Both teachers reported teaching the content for all the items on Parts B and C, but only 14 of the 33 items from parts A and D contributed to the Conservative Test.

Achievement for these students was quite high, with the mean percent correct between 85% and 92%, and with the results relatively consistent across all five classes at this grade level. The results provide further confirmation that these sixth-grade students should be ready for algebra in the seventh grade.

Table 34. Mean Percent Correct on the Conservative Test of the *Iowa Algebra Aptitude Test* by Class: Grade 6 Case Study

School	Class	*n*	Mean Percent	s.d.
02	002	17	90.9	6.1
	003	12	91.5	6.7
04	012	21	87.8	7.5
	013	23	85.8	7.6
	014	22	88.8	6.3
Overall Grade 6[a]		95	88.6	7.1

Note: The *Conservative Test* consists of 44 items (A1-A7, B1-B15, C1-C15, D1-D6, D8).

[a] The overall grade 6 result is based on using the student, rather than the class, as the unit of analysis.

Summary for the *Iowa Algebra Aptitude Test*

The *IAAT* provides insight into students' readiness to study algebra, typically in a formal algebra class. These standardized test results are, obviously, only one means of assessing students' readiness for algebra. Other factors, such as attendance, willingness to complete homework, and motivation, are also important indicators in determining success in algebra. The technical manual for the *IAAT* (Schoen & Ansley, 1993b) reports the percent of students earning various grades in algebra based on the standard score on the overall test. Based on the overall mean score for these sixth-grade students, about 80% of students would be expected to earn a grade of B or better at the end of the first semester of algebra and 77% would be expected to earn this grade at the end of the second semester.

Achievement on the *Algebra/Geometry Readiness Test: Part One*

The *Algebra/Geometry Readiness Test: Part One* is a 40 item multiple-choice test constructed by UCSMP personnel. Twenty-four of the items were repeated from the pretest to assess mathematical growth over the course of the year.

Overall Achievement on the *Algebra/Geometry Readiness Test: Part One*

Table 35 reports the mean and mean percent correct on the entire *Algebra/Geometry Readiness Test: Part One*. Figure 8 uses boxplots to illustrate the range of scores, in terms of percent correct, for the five classes in the Grade 6 Case Study.

The mean for these advanced sixth-grade students varies from 29.5 (73.7%) in School 04, Class 013 to 33.1 (82.6%) in School 02, Class 002. Students at School 02 scored about 5-8% better than their peers at School 04, perhaps due to the slightly higher opportunity-to-learn percentage at School 02. As the boxplots in Figure 8 suggest, the middle 50% of the scores for each class are relatively homogenous, with the scores in the classes at School 02 a bit closer together than in the classes at School 04. The individual scores ranged from 45% in Class 013 in School 04 to 98% in Class 002 in School 02.

Among the 40 items on the test, 9 dealt with Skills, 6 with Properties, 10 with Uses, and 15 with Representations. Table 36 reports the percent correct by class for each of these four

dimensions of understanding. For these sixth-grade students, achievement was generally balanced across all four dimensions, with the percent correct slightly higher for properties than for the other dimensions. Overall, the percent correct varied from 72.7% for Uses to 87.2% for Properties.

Table 35. Mean Score, Mean Percent Correct, and Teachers' Reported Opportunity-to-Learn on the *Algebra/Geometry Readiness Test — Part One* by Class: Grade 6 Case Study

School	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	OTL %
02	002	17	33.1 (2.7)	82.6 (6.8)	100
	003	12	32.8 (3.0)	82.1 (7.5)	100
04	012	21	30.4 (2.7)	76.0 (6.7)	92.5
	013	23	29.5 (4.5)	73.7 (11.2)	92.5
	014	22	30.7 (3.3)	76.8 (8.3)	92.5
Overall Grade 6[a]		95	31.0 (3.6)	77.6 (9.0)	

Note: Maximum score is 40.

[a] The overall grade 6 result is based on using the student, rather than the class, as the unit of analysis.

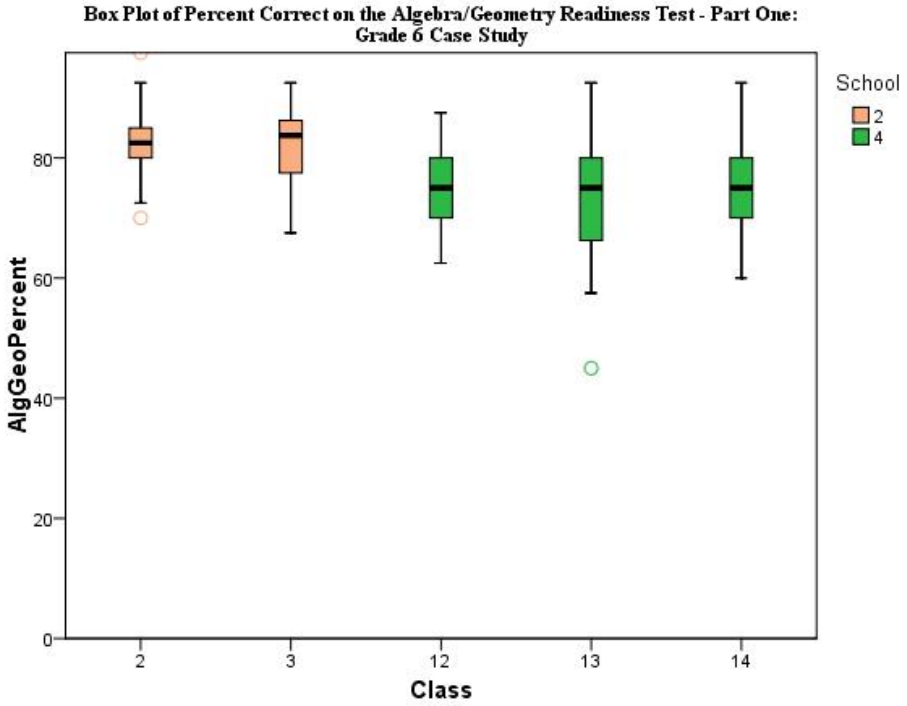


Figure 8. Box Plots of Percent Correct by Class for the *Algebra/Geometry Readiness Test — Part One*: Grade 6 Case Study

Table 36. Mean Percent Correct (Standard Deviation) for the Items Comprising the Four Dimensions of Understanding on the *Algebra/Geometry Readiness Test — Part One* by Class: Grade 6 Case Study

School	Class	*n*	Skills	Prop.	Uses	Rep.
02	002	17	86.3 (11.5)	87.3 (12.5)	79.4 (14.8)	80.1 (10.0)
	003	12	84.3 (13.8)	88.9 (14.8)	80.88 (13.8)	78.9 (8.4)
04	012	21	76.2 (15.0)	90.5 (11.3)	69.5 (15.0)	74.3 (10.0)
	013	23	70.0 (18.5)	81.2 (16.9)	70.4 (13.3)	75.1 (13.5)
	014	22	71.7 (14.0)	89.4 (13.2)	68.6 (12.8)	80.3 (10.6)
Overall Grade 6[a]		95	76.5 (16.0)	87.2 (14.1)	72.7 (14.5)	77.6 (11.0)

Note: The percents were based on the following groups: *Skills*, 9 items (1, 4, 10, 12, 19, 25, 27, 28, 34); *Properties*, 6 items (2, 9, 15, 16, 23, 37); *Uses*, 10 items (3, 5, 7, 8, 11, 13, 18, 29, 32, 35); and *Representations*, 15 items (6, 14, 17, 20, 21, 22, 24, 26, 30, 31, 33, 36, 38, 39, 40).

[a] The overall grade 6 result is based on using the student, rather than the class, as the unit of analysis.

Achievement on the Fair Tests from the *Algebra/Geometry Readiness Test: Part One*

Table 37 reports the achievement results for the *Fair Tests* constructed for each school. Overall, the mean percents correct changed little from the entire test results to the Fair Test results, even though the Fair Tests control for opportunity-to-learn at the class/school level.

Table 37. Mean Percent Correct on the Fair Tests of the *Algebra/Geometry Readiness Test — Part One* by Class: Grade 6 Case Study

School	Class	*n*	Mean Percent	s.d.
02	002	17	82.6	6.8
	003	12	82.1	7.5
04	012	21	75.7	7.2
	013	23	74.3	11.7
	014	22	76.8	7.8

Note: Items comprising each *Fair Test* are as follows: for School 02, all 40 items; for School 04, 37 items (1-19, 21-29, 32-40).

Achievement on the Conservative Test from the *Algebra/Geometry Readiness Test: Part One*

Table 38 reports the achievement results for the 37 items on the *Conservative Test* constructed for the Grade 6 Case Study. The only three items not included deal with angle measures in overlapping triangles, the area of a square given the area of a triangle interior to it, and the solution to an equation illustrated via a balance.

Table 38. Mean Percent Correct on the Conservative Test of the *Algebra/Geometry Readiness Test — Part One* by Class: Grade 6 Case Study

School	Class	*n*	mean	s.d.
02	002	17	82.7	6.8
	003	12	82.2	7.7
04	012	21	75.7	7.2
	013	23	74.3	11.7
	014	22	76.8	7.8
Overall Grade 6[a]		95	77.7	9.1

Note: Items comprising the *Conservative Test* include 37 items (1-19, 21-29, 32-40).

[a] The overall grade 6 result is based on using the student, rather than the class, as the unit of analysis.

Achievement on the Growth Items on the *Algebra/Geometry Readiness Test: Part One*

Table 39 reports the mean percent correct at the beginning and end of the year for the 24 items common to the *Middle School Mathematics Test* (i.e., one of the pretests) and the *Algebra/Geometry Readiness Test: Part One* (i.e., one of the posttests). Among these 24 items, 6 focus on Skills, 4 on Properties, 6 on Uses, and 8 on Representations, to cover all of the four dimensions of understanding overtly identified in *Transition Mathematics*. At School 02, students had an opportunity to learn the content for all of these items, but at School 04 they did not have an opportunity to learn the content for items 30 (finding the area of a square when given the area of a triangle inside) and 31 (solving an equation on a balance).

Growth over the year was significant for this group of sixth-grade students. The increase was the least (13.9%) for School 02, Class 003 and the greatest (24.4%) for School 04, Class 012. Although the scores on the posttest were comparable across the five classes, the higher pretest scores at School 02 left less room for growth. Overall, the effect size for the growth across this group was 2.60, indicating significant growth of 2.6 standard deviations.

Table 39. Mean Percent Correct for Items Common to the *Middle School Mathematics Test* and the *Algebra/Geometry Readiness Test — Part One* by Class: Grade 6 Case Study

			Pretest		Posttest[b]	
School	Class	*n*	mean	s.d.	mean	s.d.
02	002	17	69.1	12.5	87.0	9.4
	003	12	73.6	11.1	87.5	7.3
04	012	21	58.3	14.6	82.7	5.5
	013	23	59.8	10.9	77.4	11.8
	014	22	58.9	10.1	80.1	8.4
Overall Grade 6[a, c]		95	62.7	13.0	82.2	9.5

Note: The posttest items comprising these results are items 1, 3, 4, 6, 8, 9, 10, 11, 12, 13, 16, 17, 18, 21, 23, 24, 25, 26, 30, 31, 32, 33, 34, 37.

[a] The overall grade 6 result is based on using the student, rather than the class, as the unit of analysis.

[b] Using a dependent measures *t*-test on the mean of the differences by class, the growth from pretest to posttest was significant for this Grade 6 Case Study group, $\bar{x} = 19.0, s_{\bar{x}} = 3.97, t = 10.69, p = 0.0004$.

[c] Using the formula recommended by Dunlap et al. (1996), the effect size for the growth is $d = 2.60$, where $t_c = 10.69$, $r = 0.852$, and $n = 5$.

Item-Level Achievement on the *Algebra/Geometry Readiness Test: Part One*

Item scores were examined to provide another means of understanding the achievement results reported earlier in this section. Figure 9 contains the stems of the items on the *Algebra/Geometry Readiness Test: Part One*, grouped by content strand; each complete item, with graphics and option choices, can be found in Appendix D. Table 40 reports the percent of students in each class, along with the overall percentage of the students in the sixth-grade group, who were able to answer each item in Figure 9 successfully. In addition, for those items common to the pretest and posttest, the pretest percents correct are also shown. Likewise, for those test items that were originally on the National Assessment of Educational Progress (NAEP) or the Third International Mathematics and Science Study (TIMSS)[12], the national or international percent correct on those items is shown. In interpreting these percents, it is important to take into consideration that the NAEP and TIMSS percents are for students at grade 8, and the students participating in the case study of *Transition Mathematics* are at grade 6.

For those 25 items from NAEP or TIMSS, the sixth-grade students had higher achievement than the students in the corresponding national or international sample on all but two of the items: item 4 (finding the length of the side of a square from the perimeter); and item 35 (writing a decimal as a fraction). In fact, the percent correct for the sixth-grade students was at least 20%

[12] The Third International Mathematics and Science Study is now called the Trends in International Mathematics and Science Study.

higher than the NAEP or TIMSS sample on 16 of these 25 items (items 8, 18, 12, 1, 39, 6, 11, 26, 28, 20, 19, 2, 27, 5, 7, 29) and between 10% and 20% higher on item 15.

On 23 of the 40 items (57.5%), the overall percent correct for these sixth-grade students was at least 80%: all of the items on variables and their uses, four of the items on equations and inequalities (items 12, 31, 23, 39), five of the items on measurement (items 10, 6, 21, 33, 11), two of the items on transformations and symmetry (items 26, 24), three of the items on geometric figures and their properties (items 19, 22, 38), and three of the items on arithmetic (items 2, 27, 5). Thus, the sixth-grade students had solid achievement in all content strands assessed on this posttest that were included in the *Transition Mathematics* textbook.

Figure 9. Stems of UCSMP *Algebra/Geometry Readiness Test: Part One* Items by Content Strand and SPUR Category

Posttest (Pretest) Item No.	SPUR	Item Stem
Variables and Their Uses		
3 (35)	U	There were x boxes. Each box had s shoes in it. How many shoes are there in all?
8* (40)	U	Tetsu rides his bicycle x miles the first day, y miles the second day, and z miles the third day. Which of the following expressions represents the average number of miles per day that Tetsu travels?
13 (45)	U	There are x students from a class on school teams. There are y students in the class. How many students are <u>not</u> on school teams?
18* (48)	U	A plumber charges customers \$48 for each hour worked plus an additional \$9 for travel. If h represents the number of hours worked, which of the following expressions could be used to calculate the plumber's total charge in dollars?
9 (41)	P	Which expression describes the pattern in the first four rows of the table?
37 (59)	P	Which expression fits all instances of the pattern below?
Equations and Inequalities		
12* (44)	S	Suppose that $3 \times (\square + 5) = 30$. The number in the box should be _____.
25 (53)	S	Solve: $n - 3 = 2n + 19$.
31* (55)	R	The objects on the scale below make it balance exactly. According to this scale, if △ balances ○○○, then □ balances which of the following?
1* (37)	S	What is the least whole number x for which $2x > 11$?
16 (46)	P	If m and n are not zero, which of the following is <u>not</u> necessarily true?
23 (49)	P	The dot • stands for multiplication. Suppose you can replace x by any number you wish. Which is <u>not</u> correct?
14	R	Which is the graph of the equation $x + y = 10$?
39**	R	The graph below shows the humidity in a room as recorded on a certain morning. On the morning shown in the graph, how many times between 6 a.m. and 12 noon was the humidity exactly 20 percent?

Posttest (Pretest) Item No.	SPUR	Item Stem
Measurement		
4* (36)	S	The perimeter of a square is 36 inches. What is the length of one side of the square?
10 (42)	S	A rectangle has length of 3.6 cm and width of 5 cm. Which numerical expression gives the perimeter of the rectangle?
17 (47)	R	Consider the two figures below. All of the angles are right angles. How do the perimeters of the two figures compare?
6* (38)	R	Which numerical expression gives the area of the rectangle at the right?
21 (51)	R	A rectangular pool has dimensions 10 meters by 30 meters. It is surrounded by a walkway as shown by the shading in the diagram at right. Which of the following gives the area of the walkway in square meters?
30* (54)	R	If the area of the shaded triangle shown at the right is 4 square inches, what is the area of the entire square?
33 (57)	R	Each square on the grid at the right represents 1 square unit. Find the area of figure *PIGS* in square units.
11* (43)	U	Suppose that a measurement of a rectangular box is given as 48 cubic inches. What could the measurement represent?
32 (56)	U	A small plastic cube has a volume of 64 cubic inches. It is going to be covered with soft fabric to make a baby toy. How much fabric, in square inches, will be needed to cover the cube if the fabric does not overlap?
34 (58)	S	How many cubes 1 cm by 1 cm by 1 cm can be packed in a box measuring 2 cm by 5 cm by 6 cm?
Transformations and Symmetry		
26* (50)	R	Consider the triangle and line shown at the right. Which of the following shows the result of flipping the triangle over the line ℓ?
24 (52)	R	Triangle *TRY* is translated 3 units to the right and 4 units up. What will be the coordinates of the image of point *Y*?
36**	R	The line *m* is a line of symmetry for figure *ABCDE*. The measure of angle *BCD* is …
Geometric Figures and Their Properties		
15**	P	Of the following, which is NOT true for all rectangles?
28**	S	In a quadrilateral, each of two angles has a measure of 115°. If the measure of a third angle is 70°, what is the measure of the remaining angle?
40**	R	The figure represents two similar triangles. The triangles are not drawn to scale. In the actual triangle *ABC*, what is the length of side *BC*?
20**	R	In this figure, triangles *ABC* and *DEF* are congruent with *BC* = *EF*. What is the measure of angle *EGC*?
19*	S	One of the acute angles in a right triangle measures 28 degrees. What is the measure, in degrees, of the other acute angle?

Posttest (Pretest) Item No.	SPUR	Item Stem
22*	R	Which of the following can be folded to form the prism above?
38*	R	Which of these shapes are cylinders?
Arithmetic		
2**	P	Which of these fractions is smallest?
27**	S	What is the value of $\frac{4}{5} - \frac{1}{3} - \frac{1}{15}$?
35**	U	The total weight of a pile of 500 salt crystals is 6.5 g. What is the average weight of a salt crystal?
5**	U	Sound travels at approximately 330 meters per second. The sound of an explosion took 28 seconds to reach a person. Which of these is the closest estimate of how far away the person was from the explosion?
7*	U	If the price of a can of beans is raised from 50 cents to 60 cents, what is the percent increase in the price?
29*	U	Of the following, which is the closest approximation to a 15 percent tip on a restaurant check of $24.99?

Note: * indicates the item is adapted from NAEP; ** indicates the item is adapted from TIMSS.

Table 40. Percent Successful on the *Algebra/Geometry Readiness Test: Part One* by Item and Class: Grade 6 Case Study

Item	SPUR	School 02		School 04			Overall Grade 6[a]	NAEP/ TIMSS Percent Correct
		002 *n* =17	003 *n*=12	012 *n*=21	013 *n*=23	014 *n*=22	*n*=95	
Variables and Their Uses								
3	U	100 (76)	100 (67)	95 (57)	91 (48)	100 (59)	97 (60)	
8	U	88 (82)	92 (92)	86 (62)	78 (70)	86 (68)	85 (73)	58*
13	U	100 (71)	100 (92)	86 (67)	83 (57)	82 (68)	88 (68)	
18	U	94 (82)	100 (58)	100 (71)	87 (83)	91 (64)	94 (73)	58*
9	P	100 (88)	100 (83)	100 (86)	100 (83)	100 (86)	100 (85)	
37	P	88 (76)	88 (58)	100 (43)	96 (57)	95 (59)	95 (58)	
Equations and Inequalities								
12	S	100 (94)	100 (100)	95 (90)	91 (87)	95 (82)	96 (89)	69*
25	S	59 (29)	58 (8)	52 (10)	57 (17)	68 (14)	59 (16)	
31	R	94 (94)	100 (92)	95 (90)	96 (87)	95 (91)	96 (91)	75*
1	S	76 (53)	92 (50)	90 (33)	61 (30)	68 (45)	76 (41)	44*
16	P	88 (24)	75 (58)	81 (19)	39 (35)	73 (14)	69 (27)	
23	P	94 (88)	100 (75)	100 (86)	91 (70)	95 (64)	96 (76)	
14	R	35	25	43	52	55	44	
39	R	88	92	86	87	82	86	58**
Measurement								
4	S	76 (88)	100 (92)	67 (71)	52 (78)	32 (73)	61 (79)	
10	S	94 (71)	92 (92)	81 (52)	83 (57)	77 (41)	84 (59)	
17	R	35 (35)	33 (25)	38 (38)	39 (39)	36 (18)	37 (32)	
6	R	94 (76)	75 (92)	86 (71)	78 (39)	95 (55)	86 (63)	48*
21	R	100 (76)	92 (83)	81 (43)	91 (52)	100 (50)	93 (58)	
30	R	76 (59)	50 (75)	67 (43)	43 (52)	68 (59)	61 (56)	

Item	SPUR	School 02		School 04			Overall Grade 6[a]	NAEP/ TIMSS Percent Correct
		002 *n* =17	003 *n*=12	012 *n*=21	013 *n*=23	014 *n*=22	*n*=95	
33	R	94 (94)	100 (100)	100 (90)	100 (96)	100 (91)	99 (94)	
11	U	94 (76)	83 (100)	81 (62)	91 (78)	86 (77)	87 (77)	41*
32	U	54 (24)	75 (33)	48 (29)	57 (26)	36 (27)	52 (27)	
34	S	94 (47)	92 (75)	81 (67)	70 (52)	59 (55)	77 (58)	
Transformations and Symmetry								
26	R	100 (88)	100 (92)	86 (76)	100 (87)	100 (91)	97 (86)	59*
24	R	94 (65)	100 (75)	90 (43)	83 (57)	82 (64)	88 (59)	
36	R	76	67	57	70	82	71	62**
Geometric Figures and Their Properties								
15	P	53	67	67	65	77	66	54**
28	S	94	58	71	57	73	71	40**
40	R	53	67	24	30	50	42	37**
20	R	76	92	76	61	68	73	38**
19	S	88	83	62	87	86	81	48*
22	R	94	92	90	96	100	95	88*
38	R	100	100	95	100	91	97	93*
Arithmetic								
2	P	100	100	95	96	95	97	62**
27	S	94	83	86	74	86	84	52**
35	U	47	42	38	43	41	42	52**
5	U	88	92	86	78	77	83	56**
7	U	71	58	24	30	27	39	16*
29	U	59	67	52	65	59	60	38*

Note: * represents Grade 8 NAEP percent correct for the item; ** represents Grade 8 TIMSS international percent correct for the item. Underlined percents indicate items for which teachers reported not teaching or reviewing the content needed for their students to answer the item. Percentages in parentheses represent the percent correct on the pretest item.

[a] The overall grade 6 result is based on using the student, rather than the class, as the unit of analysis.

Summary

The *Algebra/Geometry Readiness Test: Part One* was a second measure of students' achievement on content important in *Transition Mathematics* and important for success in subsequent mathematics courses. Both teachers reported teaching or reviewing the content needed to answer more than 90% of the items. Thus, although this test was created by UCSMP personnel, students had sufficient opportunity to learn the content needed to answer the items, at least as indicated by the teachers.

Even though the test did not count for students' grades, students generally did well on the test, with students generally doing as well as or better than eighth-grade students on those items originally administered as part of the NAEP or TIMSS assessments. In addition, students made considerable growth over the year on the 24 items that were repeated from the pretest.

Achievement on the *Algebra/Geometry Readiness Test: Part Two*

The *Algebra/Geometry Readiness Test: Part Two* (see Appendix D) is a constructed-response test developed by UCSMP personnel and graded using the rubrics found in Appendix E. Seven of the items were items released from TIMSS; two of the items were modified from items released from the NAEP assessment.

Overall Achievement on the *Algebra/Geometry Readiness Test: Part Two*

Table 41 reports the mean scores on the entire test, together with teachers' reported opportunity-to-learn. Figure 11 uses a boxplot to show the variability in the scores within each class.

Out of a maximum score of 22, the mean for these sixth-grade students ranged from 13.4 in School 02, Class 002 to 17.4 in School 04, Class 012. As the boxplots indicate, the minimum score was 6 in Class 002 in School 02 and Class 014 in School 04. The maximum was 21 in all three classes at School 04, with a maximum of 20 in both classes at School 02.

As the results in both Table 41 and Figure 10 indicate, students in School 04 performed somewhat better than students in School 02, despite a higher opportunity-to-learn percentage at School 02. This is the reverse of the general pattern of results on the previous two posttest assessments in which students in School 02 achieved at a somewhat higher level than those in School 04. Teacher T2104U1 at School 04 had a somewhat higher writing index than Teacher T2102U1 at School 02 (see Table 18 in Chapter 3), so perhaps the better performance on these constructed response items reflects the greater emphasis on writing in the classes in School 04. Also, Teacher T2104U1 indicated there was a district focus on literacy, including journal writing, so again this focus may help explain the difference in achievement on these items.

Table 41. Mean Score and Teachers' Reported OTL on the *Algebra/Geometry Readiness Test — Part Two* by Class: Grade 6 Case Study

School	Class	*n*	Mean	s.d.	OTL %
02	002	17	13.4	3.9	92.3
	003	12	14.9	3.6	92.3
04	012	21	17.4	3.1	84.6
	013	23	16.0	3.5	84.6
	014	22	16.6	3.2	84.6
Overall Grade 6[a]		95	15.8	3.6	

Note: Maximum score is 22.

[a] The overall grade 6 result is based on using the student, rather than the class, as the unit of analysis.

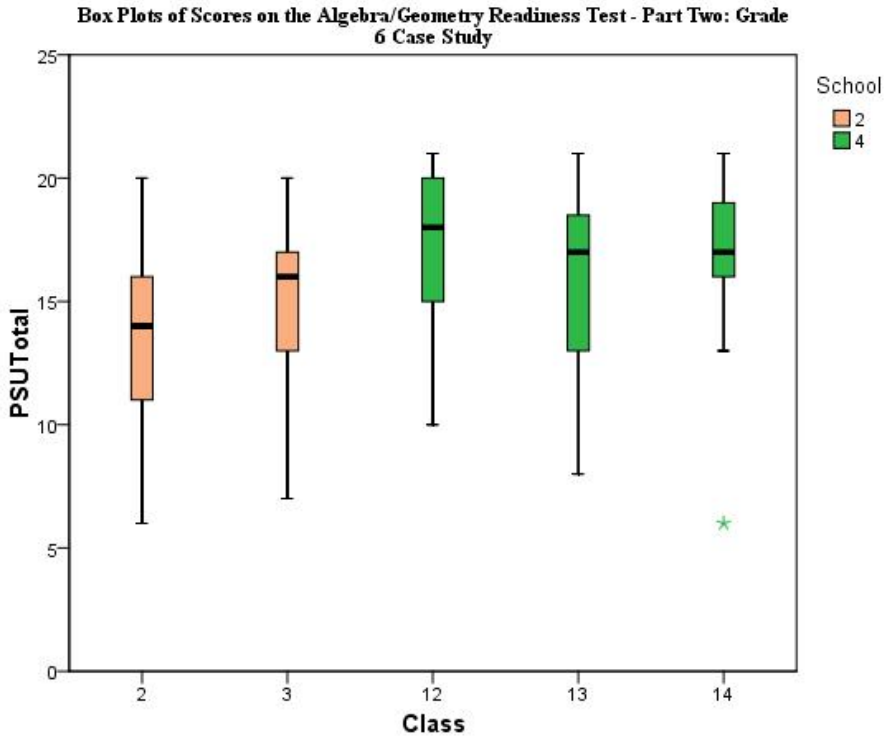


Figure 10. Box Plots of Scores on the *Algebra/Geometry Readiness Test — Part Two* by Class: Grade 6 Case Study (maximum score = 22)

Item-Level Achievement on the *Algebra/Geometry Readiness Test: Part Two*

Among the items on the *Algebra/Geometry Readiness Test: Part Two*, there are several that are either released items from TIMSS or adapted from NAEP. Table 42 reports the percent correct by class for those items scored as either right or wrong (i.e., worth 1 point) as well as the percent of students who were successful (score of 2) or partially successful (score of 1) on items on which students could receive some credit for progress toward the problem. Where the national or international percents correct for NAEP or TIMSS, respectively, are available, those percents are also reported.

The sixth-grade *Transition Mathematics* students scored at least 20% better than the eighth-grade TIMSS or NAEP sample on all shared items. Overall, the students in grade 6 performed relatively well on the items, except for solving an inequality (item 5) on which the students at School 02 were generally unsuccessful. Students scored better than 80% correct on identifying the next couple of terms in a pattern (items 12a and 12b), identifying the truth of a statement related to the distributive property (item 11a), finding the area of a rectangle inside a parallelogram (item 6), plotting and identifying points to form a rectangle (items 7a and 7b), writing a decimal as a simplified fraction (item 1), and writing a decimal between two other decimals (item 2).

Summary

The *Algebra/Geometry Readiness Test: Part Two* assessed students' achievement on the content of *Transition Mathematics* in a non-multiple choice format. Sixth-grade students studying from *Transition Mathematics* (Third Edition) achieved at least as well, if not considerably better, than eighth-grade students on TIMMS or NAEP items.

Table 42. Percent Correct (or Partially Correct) on the *Algebra/Geometry Readiness Test — Part Two* Items by Class: Grade 6 Case Study

Item	Max Score[b]	School 02		School 04			Overall Grade 6[a]	NAEP/ TIMSS Percent
		002 *n*=17	003 *n*=12	012 *n*=21	013 *n*=23	014 *n*=22	*n*=95	
Variables and Their Uses								
12a**	1	65	92	95	78	100	86	65**
12b**	1	65	92	90	87	86	84	54**
12c**	S (2)	41	50	91	57	68	63	30**
	P (1)	0	0	0	4	5	2	
Equations and Inequalities								
4**	1	41	33	67	83	77	64	44**
10**	S (2)	41	58	52	57	68	56	33**
	P (1)	0	0	9	0	0	2	
5	S (2)	0	8	76	61	59	46	
	P (1)	12	8	19	26	9	16	
11a	1	88	92	86	87	86	87	
11b	S (2)	41	33	43	52	41	43	
	P (1)	18	33	38	9	23	23	
Measurement								
6**	1	88	100	86	91	100	93	43**
Geometric Figures and Their Properties								
7a*	1	100	100	95	100	100	99	
7b*	1	100	100	95	78	91	92	60[c*]
Arithmetic								
3**	1	71	58	62	48	36	54	30**
1**	1	94	100	95	91	95	95	36**
2	1	100	100	100	78	91	93	
8a**	1	71	75	71	61	73	69	26**
8b**	1	35	50	43	39	45	42	12**
9*	S (2)	65	67	81	91	73	77	40[c*]
	P (1)	12	25	5	4	18	12	

Note: * represents Grade 8 NAEP percent correct for the item; ** represents Grade 8 TIMSS international percent correct for the item. Underlined percents indicate items for which teachers reported not teaching or reviewing the content needed for their students to answer the item.

[a] The overall grade 6 result is based on using the student, rather than the class, as the unit of analysis.

[b] *S* indicates the student was successful on the item and received the full number of points; *P* indicates the student was partially successful.

[c] These items on the *Algebra/Geometry Readiness Test: Part Two* were adapted from NAEP, but were presented in multiple-choice format on NAEP; the NAEP percents are for the multiple-choice items.

Summary

This chapter has described the achievement of sixth-grade students using the Third Edition of *Transition Mathematics*; these students were in five classes across two schools in two different states. Three instruments were used to assess achievement: the *Iowa Algebra Aptitude Test* (a standardized measure); a UCSMP constructed multiple-choice *Algebra/Geometry Readiness Test: Part One*; and a UCSMP constructed free-response *Algebra/Geometry Readiness Test: Part Two*. On all three measures, these advanced sixth-grade students scored fairly high, at or above the 85th percentile on the standardized measure and above 80% correct on the UCSMP multiple-choice assessment.

Students made statistically significant growth on items that were common to both the pretest and the posttest. Also, these sixth-graders generally performed at least as well on items taken from the National Assessment of Educational Progress or the Trends in International Mathematics Study (previously the Third International Mathematics and Science Study), and often much better, than the eighth grade national NAEP or international TIMSS samples.

Thus, the results suggest that a curriculum balanced across skills, properties, uses, and representations and with a range of content from arithmetic, geometry, and algebra can help talented sixth-grade students be successful. Based on the content of *Transition Mathematics* and of the various assessments, these advanced sixth-grade students appear to be prepared for an algebra course in the seventh grade.

Chapter 5

The Implemented Curriculum and Instruction: Matched Pairs Study

This chapter describes the implementation of both the UCSMP and comparison curriculum in the sixteen seventh-grade classes comprising the eight matched pairs participating in the Evaluation Study of *Transition Mathematics*. Knowledge of curriculum implementation can help explain any achievement differences among students in classes using different curricula, an important consideration given that classes within a school were comparable on prerequisite knowledge at the beginning of the school year.

The chapter contains four main sections. The first deals with students' opportunities to learn mathematics based on lesson coverage, opportunities for practice through assigned homework, expectations on posttest assessments, and teachers' goals for student learning over the course of the year. The second focuses on the classroom environment and instructional issues, including time devoted to mathematics instruction, nature and frequency of technology use, expectations for reading and writing, type and frequency of instructional activities as well as teachers' perspectives about the importance and frequency of particular student expectations. The third section focuses on UCSMP *Transition Mathematics* teachers' views of the Field-Trial textbook. Collectively, these sections provide data that help understand the achievement results among these students that are reported in Chapter 6. The final section contains a brief summary.

The results reported in this chapter come from both teachers and students. Teacher data are based on the *Teacher Questionnaires* completed at the beginning and end of the school year, the *Chapter Evaluation* or *Chapter Coverage* forms, the teacher interviews, and classroom observations (see Appendix C for instruments). Student data are from the *Student Information Form* completed near the end of the school year (see Appendix D).

Opportunities to Learn Mathematics

Opportunities to learn mathematics depend not only on what lessons are taught, but also on what questions might be assigned for additional practice, usually at home, and on what expectations teachers have for summative assessments. Decisions about the lessons to cover are often based on teachers' goals for student learning during the year. All these aspects of opportunity to learn mathematics are discussed in this section.

Teachers' Goals for Student Learning

At the beginning of the school year, teachers were asked to think about their instructional plans for the mathematics class during the year and respond to the question: "How important to you in your teaching are each of the following?" Then, at the end of the year, teachers responded to the follow-up question, "How important to you in your teaching were each of the following," with responses rated from *of highest importance* (4) to *quite important* (3) to *somewhat important* (2) to *of little importance* (1). Table 43 reports teachers' responses to this question at both times during the year.[13]

[13] The seven-place teacher code in the tables includes T for teacher, 2 to indicate participation in the *Transition Mathematics* study, one-digit for curriculum (1 for UCSMP, 3 for comparison), a two-digit school code, U or C for the UCSMP or comparison teacher, and 1 or 2 to indicate the first or second UCSMP or comparison teacher at the school.

Table 43. UCSMP and Comparison Teachers' Responses to the Importance of Specific Instructional Goals Based on Teacher Questionnaires: Matched Pairs Study

Activity	School 03				School 05				School 06			
	T2103U1		T2303C1		T2105U1		T2305C1		T2106U1		T2306C1	
	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End
Increase students' interest in mathematics	3	3	3	4	3	3	3	4	2	3	3	4
Help students learn mathematics concepts	4	4	3	4	4	4	4	4	4	4	4	4
Help students learn algorithms/procedures	3	3	2	2	2	2	3	4	3	3	4	4
Help students learn to perform computations with speed and accuracy	2	1	2	2	1	1	3	3	3	3	4	4
Help students learn to solve problems	3	3	4	3	4	4	3	4	4	4	4	4
Help students learn to reason mathematically	4	4	4	4	3	4	2	4	4	4	4	4
Help students learn how mathematics ideas connect to each other	3	3	4	4	2	3	3	3	3	2	4	4
Help students understand the logical structure of mathematics	2	3	3	3	3	2	2	3	3	3	4	3

Activity	School 06				School 07				Overall Average			
	T2106U2		T2306C2		T2107U1		T2307C1		*Transition Math*		Comparison	
	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End
Increase students' interest in mathematics	3	4	3	4	4	4	3	4	3.0	3.4	3.0	4.0
Help students learn mathematics concepts	4	4	4	4	4	4	4	4	4.0	4.0	3.8	4.0
Help students learn algorithms/procedures	2	3	4	4	4	4	2	3	2.8	3.0	3.0	3.4
Help students learn to perform computations with speed and accuracy	3	3	4	3	3	3	2	3	2.4	2.2	3.0	3.0
Help students learn to solve problems	4	3	4	4	4	4	3	4	3.8	3.6	3.6	3.8
Help students learn to reason mathematically	4	3	4	4	3	4	3	4	3.6	3.8	3.4	4.0
Help students learn how mathematics ideas connect to each other	3	3	4	4	4	4	3	3	3.0	3.0	3.6	3.6
Help students understand the logical structure of mathematics	2	2	4	4	3	4	2	4	2.6	2.8	3.0	3.4

Note: Responses were rated using the scale: *of highest importance* (4); *quite important* (3); *somewhat important* (2); and *of little importance* (1).

As Table 43 indicates, there was little difference over the course of the year in teachers' responses to the importance of particular instructional practices, such as helping students learn concepts, learn to solve problems, learn to make connections, or learn to reason mathematically. Teachers' ratings on the items related to these goals were generally between *quite important* to *of highest importance*. The lowest rated practice for both UCSMP and comparison teachers was for "help students learn to perform computations with speed and accuracy," with two of the UCSMP teachers rating this particular goal as *of little importance*. For most teachers, the average change in responses over the year for these eight items was 0.1; the greatest changes, toward the direction of more importance, occurred for the comparison teachers at Schools 05 and 07 whose averages increased by 0.7 and 0.8, respectively, from the beginning to the end of the year.

Discussion about teachers' goals for instruction also occurred during the interviews as teachers were asked, "What things would you most like students to learn from this course this year?" Table 44 summarizes these goals for both UCSMP and comparison teachers.

Table 44. Teacher Goals for Student Learning During the Year as Reported During the Interviews: Matched Pairs Study

School	*Transition Mathematics*		Comparison Teachers	
	Teacher	Reported Goal	Teacher	Reported Goal
03	T2103U1	How to use math in the real world and have the ability to attack problems and try them; learn to make sense of mathematics. Be able to understand percent. To be successful in algebra, learn the use of variables and patterns.	T2303C1	An appreciation and enjoyment of math, the ability to reason mathematically, the state tested standards, appropriate use of vocabulary, equation solving
05	T2105U1	Get a better grasp on fractions, decimals, percent, and learn the language of algebra.	T2305C1	Learn where to find information to follow examples and identify steps, proficiency with fractions.
06	T2106U1	Learn that math is logical, sequential, and based on previous knowledge. Know the grade level expectations for the state.	T2306C1	The state grade level expectations, such as equations, variables, geometry, data, statistics, probability, number sense.
06	T2106U2	Get a good grasp of grade level expectations for the state, which include number sense, geometry, algebra, measurement. Have them learn to think and process and not just memorize.	T2306C2	Learn the prerequisites for grade 8, such as algebraic and geometric sense, and the ability to work through problems
07	T2107U1	Learn the state standards, understand terminology, become more proficient with fractions, learn the laws of exponents.	T2307C1	Improve number sense and the ability to think through problems in terms of strategies.

Both groups of teachers generally wanted students to learn the typical mathematics expectations of the grade (e.g., number sense, basic algebra, geometry). Their interview responses together with their responses from Table 43 indicate that they also wanted students to develop an ability to think through a problem and reason mathematically.

Lesson Coverage

UCSMP curriculum. Transition Mathematics teachers completed Chapter Evaluation Forms for each chapter of the textbook they taught. On these forms, teachers indicated the lessons taught within each chapter and the questions assigned, as well as the days spent per lesson and chapter. Table 45 reports the chapters taught as well as the number of days spent on each chapter by the Third Edition teachers, including time spent on review and testing.

Table 45. Number of Days Spent on Each Chapter of UCSMP *Transition Mathematics* (Third Edition), Including Testing: Matched Pairs Study

Chapter (Number of Lessons)	Teacher					Ave.
	T2103U1	T2105U1	T2106U1	T2106U2	T2107U1	
1. *Reading and Writing Numbers (9)*	12	19	15	21	13	16
2. *Representing Numbers (7)*	11	25	13	13	10	14.4
3. *Using Variables (7)*	10	18	14	16	13.5	14.3
4. *Representing Sets of Numbers and Shapes (9)*	12	14	16	16	18	15.2
5. *Patterns Leading to Addition and Subtraction (10)*	14	18	20	18.5	18	15.7
6. *Some Important Geometry Ideas (9)*	10	25	14	25	21	19
7. *Multiplication in Geometry (9)*	14	29	18	9[a]	18	19.8[b]
8. *Multiplication in Algebra (10)*	13	11	18	0	18	15
9. *Patterns Leading to Division (10)*	12	0	0	0	17	14.5
10. *Linear Equations and Inequalities (8)*	13	0	0	0	0	13
11. *Statistics and Variability (6)*	0	0	0	0	0	0
12. *Real Numbers in Formulas (6)*	11	0	0	0	0	11

[a] Teacher taught only the first five lessons of the chapter.

[b] Data from Teacher T2106U2 are not included in the group average given that the teacher only taught through Lesson 7-5.

The UCSMP teachers at Schools 03 and 07 tended to spend about a day or a day and a half per lesson, including review and testing. In contrast, the UCSMP teachers at Schools 05 and 06 often spent more than two days per chapter.

Table 46 reports the data from Table 45 in terms of the percent of the book's lessons taught, overall and by thirds of the book, as well as the percent of activities taught from those chapters that teachers completed. Because teachers could have covered comparable percentages of the book while covering very different content, the actual pattern of lesson coverage is illustrated in Figure 11 using displays similar to those by Tarr, Chávez, Reys, and Reys (2006) in their study of curriculum enactment.

Table 46. Percent of Lessons Taught by UCSMP *Transition Mathematics* (Third Edition) Teachers, Overall and by Thirds of the Book, and Percent of Activities Taught: Matched Pairs Study

School	Teacher	Chapters (Number of Lessons)				Activities[a]
		Ch. 1-4 (32 lessons)	Ch. 5-8 (38 lessons)	Ch. 9-12 (30 lessons)	Ch. 1-12 (100 lessons)	
03	T2103U1	88	87	63	80	13
05	T2105U1	100	97	0	69	85
06	T2106U1	100	100	0	70	46
06	T2106U2	100	63	0	56	100
07	T2107U1	100	100	33	80	100

[a] Percent is based only on the number of activities completed in the chapters taught. Chapters 1-12 contain a total of 17 Activities.

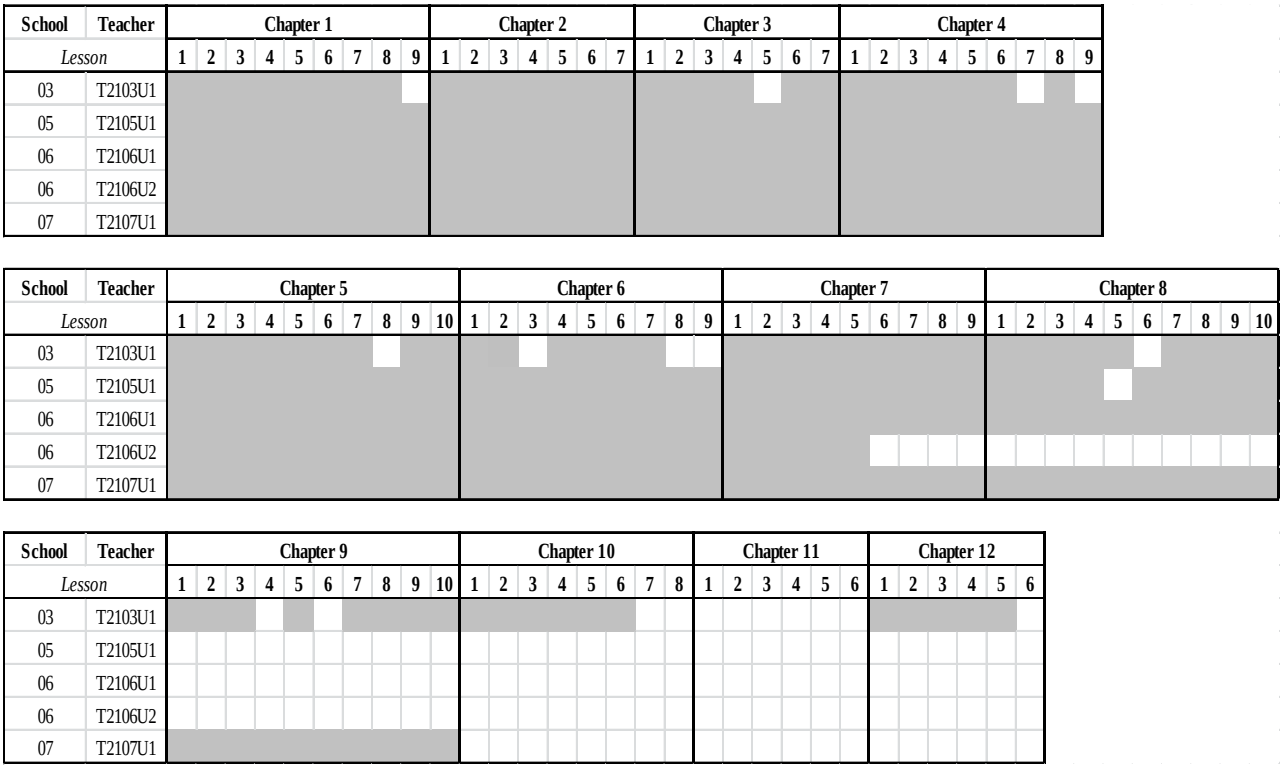


Figure 11. Pattern of Lesson Coverage in the UCSMP *Transition Mathematics* (Third Edition) Matched Pairs Study Classes (Gray shading indicates the lesson was taught.)

In general, the UCSMP *Transition Mathematics* teachers taught the first eight chapters of the book, with the exception of Teacher T2106U2 at School 06 who only taught through the middle of Chapter 7. Only the *Transition Mathematics* teachers at Schools 03 and 07 taught any parts of Chapters 9-12. Teacher T2103U1 regularly skipped lessons but taught some lessons from all chapters except Chapter 11.

In general, teachers had students complete the SPUR Chapter Review in all chapters they taught; the only exception is Chapter 8 for the UCSMP teacher at School 05. Also, teachers generally had students complete the Self-Test in all chapters taught; the exceptions were Chapter 2 for the UCSMP teacher at School 07, Chapter 6 for the UCSMP teacher at School 03, and Chapter 8 for the UCSMP teacher at School 05.

Although teachers generally had students complete the Self-Test and the SPUR Review in the chapters they taught, the same was not the case with the In-Class Activities. The UCSMP teacher at School 03 had students complete only about 13% of the activities; for this teacher, not completing the activities and skipping some lessons on a regular basis enabled him to teach some lessons from all but one chapter. Of note is the difference in percent of activities taught and days spent on chapters for the two UCSMP teachers at School 06; Teacher T2106U2 had students complete all the activities in the chapters she taught, but she spent longer on many chapters than Teacher T2106U1 and did not cover as many chapters.

Teachers commented about the importance of active learning and the extent to which the text encouraged them to incorporate these practices into their instruction.

> "I think the increase in activities [from Second Edition] you have is good. I found it was almost like I could tell some teachers had talked to you about this third edition, because what you guys put in some of the teachers' notes, what you put in some of the activities, I was already doing." [Teacher T2103U1]

> "Actually, the way the book spirals and goes back and reviews that, I'd say it benefits or increases the active learning." [Teacher T2107U1]

> "I like the activities, and I don't always take the time for them, and then I miss out, I mean the students miss out when I skip it. Like in this chapter [Chapter 7], there were two activities that I should have taken out the time to do, but I was feeling crunch time coming up, so I skipped those and I think they would have been very helpful to the students to really get a grasp of what was going on in the lessons." [Teacher T2106U1]

> "I expect it [active learning] and I try, and you know it's kind of hard because this book, the way it's written, it's kind of dry." [T2106U2]

Based on the lesson coverage, it appears that most of the UCSMP *Transition Mathematics* teachers covered the lessons dealing with number representations, the models for the four operations, basic geometry, and basic equation solving. Only the UCSMP teacher at School 03 covered the chapter dealing with linear equations and inequalities and their graphs. Thus, teachers would appear to have covered those portions of the text reflected in their goals for student learning.

Non-UCSMP Curricula. Information about the content covered was also elicited from comparison teachers who were asked to complete Chapter Coverage Forms for each chapter of the textbook they taught to indicate the lessons taught, the questions assigned, and the days spent on the chapter. Although not all teachers completed the actual Chapter Coverage Forms, they all provided some information about their content coverage which is summarized in Table 47.

Table 47. Chapters Covered and Percent of Lessons Taught by Teachers Teaching from Comparison Curricula: Matched Pairs Study

School	Teacher	Textbook (Number of Lessons)	Chapters Covered[a]	Percent of Lessons Taught
03	T2303C1	Teacher created own materials[b]	Rounding, factors and divisibility, proportions, ratios, equations and expressions, shapes and their properties, scale drawings, perimeter, area and surface area, volume, coordinate graphing, statistical graphs, simple probability	na
05	T2305C1	*Scott Foresman Middle School Math Course 2* (104 lessons)	4, 5, part of 6, part of 7, 8, 9, 10, part of 11	43
06	T2306C1	*Passport to Algebra and Geometry* (117 lessons)	1, 2, 3, 4, 5, 9, part of 12	40
06	T2306C2	*Passport to Algebra and Geometry* (117 lessons)	1, 2, 3, 4, 5	42
07	T2307C1	*Mathematics: Concepts and Skills Course 2* (101 lessons)	1, 2, 3, 4, 5, 6, 7, 8, parts of 9 and 10[c]	55

[a] Chapter titles for each textbook are provided in Table 2 in Chapter 2 of this report.

[b] In addition to the listed topics, the teacher completed *Bits and Pieces II* and *Variables and Expressions* from the Connected Mathematics Project as well as Chapters 2 and 4 from UCSMP *Transition Mathematics* (Second Edition).

[c] Based on scheduled semester outline of assignments.

Looking across the chapters taught by the comparison teachers, it appears that all comparison teachers taught integer operations, basics of algebra, operations with rational numbers, basic geometry concepts, and statistical graphs. Thus, the comparison teachers appear to have taught content similar to that of the UCSMP teachers and content aligned to their stated goals for student learning.

Summary. Both the UCSMP and comparison teachers taught most of the same concepts. It appears that the comparison teachers may have been more likely to teach linear equations and inequalities than the UCSMP teachers.

Questions Assigned for Homework Practice

UCSMP Transition Mathematics. Table 48 reports the percent of questions assigned in each of the categories *Covering the Ideas*, *Applying the Mathematics*, and *Review* for the lessons teachers taught.

Table 48. Number and Percent of Question Types Assigned by UCSMP *Transition Mathematics* Teachers to Students, Based Only on Lessons Taught: Matched Pairs Study

School	Teacher	Covering the Ideas		Applying the Mathematics		Review		Total	
		Number	%	Number	%	Number	%	Number	%
03	T2103U1	905	91	491	83	271	48	1667	78
05	T2105U1	802	92	344	61	237	50	1383	72
06	T2106U1	812	93	553	97	233	48	1598	83
06	T2106U2	703	96	462	96	314	82	1479	93
07	T2107U1	960	99	615	99	518	91	2093	97

Note: Number represents the actual number of problems assigned of each type. The percent is determined by dividing this number by the number of possible problems in the lessons taught.

The results suggest that teachers generally assigned the *Covering the Ideas* questions, with more than 90% of those problems assigned. All but two of the teachers also assigned at least 90% of the *Applying the Mathematics* questions. However, there was considerable variability in the percent of the *Review* questions that were assigned. Because the *Review* questions provide opportunities for student mastery of skills and concepts, omission of the opportunities for review may limit students' opportunity to develop the needed proficiency to be successful in the course and in subsequent courses. Overall, three of the five UCSMP teachers assigned less than 50% of the *Review* problems. As indicated in Chapter 2, the initial achievement of students at School 05 was quite low, so these students might have needed additional opportunities to practice in order to develop mastery; yet, the indicated assignments of the teacher did not afford students such opportunities. This variability in the opportunities to review important concepts should be considered when reviewing the student achievement results among the students in these classes in Chapter 6 of this report.

Non-UCSMP Classes. Based on the Chapter Coverage Forms or the semester outlines provided by the comparison teachers, information was obtained about the homework assigned by the comparison teachers. Table 49 summarizes the percent of questions assigned by these teachers. Comparison teachers T2305C1 and T2306C1 regularly assigned problems from a workbook or from worksheets accompanying the textbook; so, even though their textbook percentages are relatively low, students were expected to complete regular assignments.

Teachers also regularly had students complete mid-chapter reviews, end-of-chapter reviews, and cumulative reviews. In particular, Teacher T2305C1 spent about 10 days in review at the beginning of February.

Table 49. Percent of Textbook Questions Assigned to Students by non-UCSMP Teachers, Based Only on Lessons Taught

School	Teacher	Textbook (Number of Lessons)	Percent of Questions Assigned in Lessons Taught
03	T2303C1	Teacher created own materials	na
05	T2305C1	*Scott Foresman Middle School Math Course 2* (104 lessons)	8[a]
06	T2306C1	*Passport to Algebra and Geometry* (117 lessons)	19[b]
06	T2306C2	*Passport to Algebra and Geometry* (117 lessons)	54
07	T2307C1	*Mathematics: Concepts and Skills Course 2* (101 lessons)	46[c]

[a] This teacher appeared to assign most problems from workbook pages related to the lesson topics.

[b] This teacher used worksheets on a regular basis, in place of or as supplements to the questions assigned from the textbook.

[c] Although this teacher regularly assigned problems from the textbook, she also had additional projects and teacher prepared materials that students completed.

Preparation for State Assessments

The high stakes accountability of the No Child Left Behind legislation often puts pressure on schools and districts in relation to student achievement. Teachers were asked whether they spent time using material not in the textbook to review for the state or other standardized assessment, and what influenced the time spent on review. Table 50 summarizes the teachers' responses.

The results show variability in additional review that influences the overall opportunities to learn mathematics from the textbook. Teachers spent from a few hours in review to as much as 6 weeks to ensure that students had mastered the specific skills assessed by the high-stakes test required by the school. Interestingly, UCSMP Teacher T2103U1 commented that Chapters 1-9 of the text provided adequate preparation for the test, and his review focused on topics not yet taught. Also, at School 06, the UCSMP and comparison teacher in the first pair (T2106U1 and T2306C1, respectively) spent no additional time on review; the UCSMP teacher, and her students, thought the curriculum provided sufficient preparation for the test. In contrast, their peers in the second pair (T2106U2 and T2306C2) spent from three to six weeks in review.

Table 50. Time Reported Reviewing for State or Standardized Assessments, and Reason for Doing So: Matched Pairs Study

School	*Transition Mathematics* Teachers			Comparison Teachers		
	Teacher	Time	Reason	Teacher	Time	Reason
03	T2103U1	3 weeks	Review, practice tests based on formative tests, focus on standards not addressed in text. (*Transition Mathematics* Chapters 1-9 adequately prepared for the test.)	T2103C1	No time listed	Everything done was Standards-driven. Review was based on formative results.
05	T2105U1	1 week	School requirement	T2305C1	8 classes	None listed
06	T2106U1	None	The text covered all the concepts expected on the test.	T2306C1	None	State district requirements, released test items, teacher experience with released state test items
06	T2106U2	3 weeks	School requirements to teach or review basic skills that students had still not mastered	T2306C2	5-6 weeks	Released state test items
07	T2107U1	No time listed	District requirements	T2307C1	Nothing listed	Review occurred all the way along; because there is a district test, I keep reviewing as a personal philosophy

Expectations on Posttest Assessments

Table 51 reports the percent of items on each posttest for which teachers reported that students had an opportunity to learn the needed content. On the *Iowa Algebra Aptitude Test*, there is variability in the OTL only on Parts A and D. On portions of Part A, students are expected to read a passage about unknown content and then answer questions based on the information from the reading; teachers generally reported not having taught the content needed to answer these items. Likewise, on Part D one portion requires students to consider the relationship among variables and how changes in one influences changes in the others; again, on this portion, teachers often reported not having taught the needed content.

Table 51. Percent Opportunity-to-Learn on Each Posttest reported by UCSMP *Transition Mathematics* and Comparison Teachers: Matched Pairs Study

School	Teacher	*Iowa Algebra Aptitude Test*					*Algebra/Geometry Readiness Test*	
		Part A	Part B	Part C	Part D	Total	Part One	Part Two
03	T2103U1	72	100	100	47	79	95	856
	T2303C1	39	100	100	47	70	70	548
05	T2105U1	39	100	100	47	70	55	625
	T2305C1	67	100	100	87	87	885	69
06	T2106U1	72	100	100	100	92	95	100
	T2306C1	72	100	100	93	91	95	100
06	T2106U2	72	100	100	100	92	95	100
	T2306C2	72	100	100	93	91	100	100
07	T2107U1	72	100	100	93	91	100	100
	T2307C1	67	100	100	67	83	100	100

The OTL responses will be used in Chapter 6 to analyze achievement results in ways that control for opportunity to learn, both at the individual school level and at the group level. Figures 12-14 illustrate the items on which the two teachers in each matched pair indicated that students had opportunities to learn the content on the three posttests. Thus, the figures provide an item-by-item picture of OTL and illustrate the extent to which teachers agreed about which items were appropriate for students at this course level. As seen in the figures, the variability in OTL for pairs of teachers was greatest at Schools 03 and 05 for all three posttests.

With the exception of comparison teacher T2303C1 who created her own materials and UCSMP teacher T2105U1, the OTL for the UCSMP developed *Algebra/Geometry Readiness Test: Part One* was over 85%. For UCSMP teacher T2105U1, geometry or measurement concepts accounted for 78% of the items for which OTL was reported as no; geometry accounted for 67% of the items for which comparison teacher T2303C1 reported no for the OTL. So overall, the results suggest that this test, although developed by project personnel, was appropriate for both groups of students, regardless of curricula.

On the *Algebra/Geometry Readiness Test: Part Two*, teachers generally reported a high OTL percentage, except for comparison teacher T2303C1 and both teachers at School 05.

School	Teacher	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18
03	T2103U1																		
03	T2303C1																		
05	T2105U1																		
05	T2305C1																		
06	T2106U1																		
06	T2306C1																		
06	T2106U2																		
06	T2306C2																		
07	T2107U1																		
07	T2307C1																		

School	Teacher	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
03	T2103U1															
03	T2303C1															
05	T2105U1															
05	T2305C1															
06	T2106U1															
06	T2306C1															
06	T2106U2															
06	T2306C2															
07	T2107U1															
07	T2307C1															

School	Teacher	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
03	T2103U1															
03	T2303C1															
05	T2105U1															
05	T2305C1															
06	T2106U1															
06	T2306C1															
06	T2106U2															
06	T2306C2															
07	T2107U1															
07	T2307C1															

School	Teacher	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15
03	T2103U1															
03	T2303C1															
05	T2105U1															
05	T2305C1															
06	T2106U1															
06	T2306C1															
06	T2106U2															
06	T2306C2															
07	T2107U1															
07	T2307C1															

Figure 12. Opportunity-to-Learn on the *Iowa Algebra Aptitude Test: Parts A-D* as Reported by Matched Pairs Study Teachers (Gray shading indicates the item was reported as taught.)

School	Teacher	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
03	T2103U1																				
03	T2303C1																				
05	T2105U1																				
05	T2305C1																				
06	T2106U1																				
06	T2306C1																				
06	T2106U2																				
06	T2306C2																				
07	T2107U1																				
07	T2307C1																				

School	Teacher	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
03	T2103U1																				
03	T2303C1																				
05	T2105U1																				
05	T2305C1																				
06	T2106U1																				
06	T2306C1																				
06	T2106U2																				
06	T2306C2																				
07	T2107U1																				
07	T2307C1																				

Figure 13. Opportunity-to-Learn on the *Algebra/Geometry Readiness Test: Part One* as Reported by Matched Pairs Study Teachers (Gray shading indicates the item was reported as taught.)

School	Teacher	1	2	3	4	5	6	7	8	9	10	11	12	12c
03	T2103U1													
03	T2303C1													
05	T2105U1													
05	T2305C1													
06	T2106U1													
06	T2306C1													
06	T2106U2													
06	T2306C2													
07	T2107U1													
07	T2307C1													

Figure 14. Opportunity-to-Learn on the *Algebra/Geometry Readiness Test: Part Two* as Reported by Matched Pairs Study Teachers (Gray shading indicates the item was reported as taught.)

Instructional Practices

This section addresses the time spent on mathematics instruction across schools and classes, the nature of instructional activities, particular instructional practices, expectations for homework, and the use of supplementary materials. Results are based on data from the *Teacher Questionnaires*, the *Chapter Evaluation/Chapter Coverage Forms*, the teacher interviews (See Appendix C) and from the *Student Information Form* (see Appendix D).

Time Spent on Mathematics Instruction

Weekly time for mathematics instruction was generally 50 to 55 minutes per day, with one exception. At School 05, students only met for 43 minutes per day; these students, who initially started out at the lowest achievement levels among all the classes, were only able to cover 69% of the UCSMP *Transition Mathematics* textbook and 43% of the comparison textbook.

Instructional Activities

At the beginning of the school year, teachers were asked to think about their instructional plans for their class by responding to the question: "About how often do you plan to do each of the following in your mathematics instruction?" Then, at the end of the year, teachers responded to "About how often did you do each of the following in your mathematics instruction," with responses rated from *almost all lessons* (4) to *often* (3) to *sometimes* (2) to *almost never* (1). In addition, teachers indicated the percent of each week in which students engaged in instruction within whole class, small groups, or independent seatwork and to indicate the percent of time in a typical lesson spent on warm ups, homework review, lesson introduction, or classroom management. Together, these questions provide insight from the teachers about their instructional practices over the course of the year.

Table 52 reports teachers' responses to the frequency of various instructional activities. Responses to these questions can be compared to teachers' reported percentages of time spent in particular instructional arrangements (Table 53) and on particular lesson activities (Table 54).

As Table 52 indicates, UCSMP teachers reported engaging students in whole class discussions slightly more often than comparison teachers; this rating agrees with the results in Table 53, in which UCSMP teachers engaged in whole class instruction about 54% of the time compared to 48% of the time for comparison teachers. At the end of the year UCSMP teachers reported engaging students in small cooperative groups *sometimes* to *often* (2.6) while comparison teachers reported engaging students in small groups *often* to *almost all lessons* (3.4). However, when indicating the time spent each week in small cooperative groups, the difference does not seem to be as large (20% to 24%, respectively).

UCSMP *Transition Mathematics* teachers made some comments about having students work in small groups:

> "I try to introduce the lesson, go over some examples, have them go over some examples with me, then I have 'em do problems … I say compare your answers with your partner." [Teacher T2103U1]

> "It's been more [working in small groups] than I've done in the past because there's been opportunities for them to work in groups. Probably once or twice per chapter that they would work in a group." [Teacher T2107U1]

Table 52. UCSMP and Comparison Teachers' Responses to the Frequency of Specific Instructional Practices Based on Teacher Questionnaires: Matched Pairs Study

Activity	School 03				School 05				School 06			
	T2103U1		T2303C1		T2105U1		T2305C1		T2106U1		T2306C1	
	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End
Engage whole class in discussions	3	4	3	4	2	2	3	3	4	4	3	3
Have students work in small groups	4	4	4	3	4	2	2	3	4	2	3	3
Introduce content through formal presentations	4	3	2	2	3	3	4	4	2	1	3	3
Have students listen and take notes	4	4	3	2	3	3	3	2	2	3	3	3
Have students use concrete materials	2	2	3	4	2	2	2	2	3	1	2	2
Pose open-ended questions	4	3	3	4	2	3	3	3	4	3	3	3
Have students use math concepts to solve applied problems	4	3	3	3	2	3	3	3	3	1	3	3
Ask students to consider alternative methods	3	2	2	3	3	1	2	2	3	2	3	3
Ask students to use multiple representations	1	1	3	3	2	2	2	2	3	2	3	3
Help students see connections	3	2	3	3	2	2	2	2	3	2	3	3

Activity	School 06				School 07				Overall Average			
	T2106U2		T2306C2		T2107U1		T2307C1		*Transition Math*		Comparison	
	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End
Engage whole class in discussions	3	4	4	3	4	3	4	4	3.2	3.4	3.4	3.2
Have students work in small groups	3	3	4	4	3	2	3	4	3.6	2.6	3.2	3.4
Introduce content through formal presentations	3	2	4	4	4	2	3	3	3.2	3.0	3.2	3.2
Have students listen and take notes	3	2	4	3	4	3	3	4	3.2	3.0	3.2	2.8
Have students use concrete materials	2	2	4	2	2	3	3	2	2.2	2.0	2.8	2.4
Pose open-ended questions	3	2	4	3	3	2	2	2	3.2	2.6	3.0	3.0
Have students use math concepts to solve applied problems	2	3	4	3	4	4	2	3	3.0	2.8	3.0	3.0
Ask students to consider alternative methods	3	2	3	3	1	4	3	3	2.6	2.2	2.6	2.8
Ask students to use multiple representations	2	2	4	3	4	2	3	2	2.4	1.8	3.0	2.6
Help students see connections	2	1	4	4	3	3	2	2	2.6	2.0	2.8	2.8

Note: Responses were rated using the scale: *almost all mathematics lessons* (4); *often* (3); *sometimes* (2); and *almost never* (1).

Table 53. UCSMP and Comparison Teachers' Reported Percent of Time Each Week Spent in Various Instructional Arrangements: Matched Pairs Study

Activity	School 03 Teachers		School 05 Teachers		School 06 Teachers	
	T2103U1	T2303C1	T2105U1	T2305C1	T2106U1	T2306C1
Whole class instruction	60	30	30	50	50	60
Small cooperative groups	30	30	30	20		10
Individual seatwork	10	10	40	20	50	30
Other		30[a]		10[b]		

Activity	School 06 Teachers		School 07 Teachers		Overall Average	
	T2106U2	T2306C2	T2107U1	T2207C1	*Transition Math*	Comparison
Whole class instruction	60	50	70	50	54	48
Small cooperative groups	20	30	20	30	20	24
Individual seatwork	20	20	10	20	26	20
Other						8

[a] Hands-on activities

[b] Quizzes, tests

Table 54. UCSMP and Comparison Teachers' Reported Percent of a Typical Lesson Spent on Various Activities: Matched Pairs Study

Activity	School 03 Teachers		School 05 Teachers		School 06 Teachers	
	T2103U1	T2303C1	T2105U1	T2305C1	T2106U1	T2306C1
Warm-up exercises/problems		20	10	15	35	10
Review of homework	25	20	20	10	30	20
Introduction of new content	70	55	60	50	30	60
Attendance, classroom management	5	5	10	5	5	10
Other				20[a]		

Activity	School 06 Teachers		School 07 Teachers		Overall Average	
	T2106U2	T2306C2	T2107U1	T2207C1	*Transition Math*	Comparison
Warm-up exercises/problems	10	20	8	10	13	15
Review of homework	30	15	30	20	27	17
Introduction of new content	50	60	60	60	54	57
Attendance, classroom management	10	5	2		6	5
Other				10[b]		6

[a] Independent work – independent/cooperative

[b] Independent work, questions, start homework

Of interest to the UCSMP developers is that UCSMP teachers reported only asking students to consider alternative methods, use multiple representations, and see connections between math and other disciplines *sometimes*. Given that the UCSMP text regularly provides multiple solutions to problems, uses symbolic and graphical representations, links different mathematics topics (e.g., algebra and geometry), and connects mathematics to real world applications, it is surprising that UCSMP teachers rated the frequency of these practices relatively low. On all three practices, comparison teachers rated more frequent use of these practices.

As the results in Table 54 indicate, the greatest difference in time spent within a typical lesson between UCSMP and comparison classes was on review of homework, with UCSMP classes spending about 50% more time on this activity than comparison classes. This difference is perhaps not unexpected. Questions in *Transition Mathematics* are designed to be quite varied, with more application problems than often found in the comparison texts. So, teachers may need more time to check that students have answered questions correctly. Or, given the discussions within the mathematics education community on less teacher-directed classrooms, it may be that teachers wanted to lecture less, and so, replaced some of their lecture time with review of homework.

Use and Frequency of Reading and Writing Strategies

All editions of *Transition Mathematics* have been written with the expectation that students *read* the textbook. The Second Edition was written with the expectation that students also learn to *write* mathematics. The Third Edition was developed to build on these expectations, with reading that would be at an appropriate level and of interest to students and with many opportunities for students to explain their thinking.

Information about reading and writing practices was obtained from multiple sources, and from both teachers and students. Taken together, they provide confirming evidence of where the self-reported data are robust or highlight areas where responses are in conflict with each other.

Table 55 summarizes responses from UCSMP and comparison teachers to questions about their reported plans at the beginning of the year and their reported use of reading and writing during the course of the year. Responses reported in Table 55 suggest little difference between UCSMP and comparison teachers in their perceived importance or desire to engage students in particular reading and writing activities. Both groups of teachers considered it to be *quite important* to help students learn to read mathematics, with the exception of both the *Transition Mathematics* and comparison teachers at School 03 who viewed this expectation as only *somewhat important*. Both groups of teachers reported helping students explain ideas effectively as *quite important* and then reported having students explain their reasoning *often* when giving answers. However, although both groups of teachers reported having students write about mathematics *sometimes*, they generally engaged students in extended investigations *almost never*.

Table 55. UCSMP and Comparison Teachers' Responses to the Importance and Frequency of Practices Related to Reading and Writing Based on the Questionnaires: Matched Pairs Study

Activity	School 03				School 05				School 06			
	T2103U1		T2303C1		T2105U1		T2305C1		T2106U1		T2306C1	
	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End
Help students learn to read mathematics	4	2	2	2	2	3	3	2	3	3	4	4
Help students learn to read (non-textbook) mathematics related materials	3	1	2	2	2	2	1	2	3	2	3	2
Help students learn to explain ideas in mathematics effectively	3	2	3	3	3	3	3	3	4	4	4	4
Have students explain their reasoning when giving an answer	4	2	4	4	4	3	2	3	4	3	4	4
Ask students to explain concepts to one another	3	4	2	3	3	2	2	2	4	3	2	2
Have students work on extended investigations or projects	1	1	1	1	2	2	1	1	1	1	1	2
Have students write about mathematics	3	2	2	2	2	2	1	1	3	3	2	3

Activity	School 06				School 07				Overall Average			
	T2106U2		T2306C2		T2107U1		T2307C1		*Transition Math*		Comparison	
	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End
Help students learn to read mathematics	4	4	4	3	4	4	4	4	3.4	3.2	3.4	3.0
Help students learn to read (non-textbook) mathematics related materials	4	3	4	3	3	4	2	3	3.0	2.4	2.4	2.4
Help students learn to explain ideas in mathematics effectively	4	3	4	4	3	4	3	3	3.4	3.2	3.4	3.4
Have students explain their reasoning when giving an answer	4	4	4	3	3	4	4	4	3.8	3.2	3.6	3.6
Ask students to explain concepts to one another	3	3	4	3	3.5	2	4	4	3.3	2.8	2.8	2.8
Have students work on extended investigations or projects	1	1	2	1	X	2	2	1	1.3	1.4	1.4	1.2
Have students write about mathematics	3	2	3	3	3	3	3	3	2.8	2.4	2.2	2.4

Note: Responses for the first three questions were rated using the scale: *of highest importance* (4); *quite important* (3); *somewhat important* (2); and *of little importance* (1). Responses for the last four were rated using the scale: *almost all mathematics lessons* (4); *often* (3); *sometimes* (2); and *almost never* (1). X indicates no response was provided.

As an additional means of determining the extent to which reading and writing occurred as a part of instruction, teachers were asked to indicate how often they expected students to read their textbook or write about mathematics (*every day, 2-3 times per week, 2-3 times per month, less than once a month, almost never*), to indicate the importance of reading and writing (*very, somewhat, not very*), and to indicate how often certain reading and writing practices occurred in the classroom (*daily, frequently, seldom, never*). Responses from these items were summed to create a reading and writing index for each teacher as another way to indicate their emphasis on these mathematical practices.[14] Table 56 reports these index scores for all teachers.

Table 56. Reading and Writing Indices Reflecting UCSMP and Comparison Teachers' Emphases on These Practices: Matched Pairs Study

Activity	School 03 Teachers		School 05 Teachers		School 06 Teachers	
	T2103U1	T2303C1	T2105U1	T2305C1	T2106U1	T2306C1
Reading Index	11	4[a]	15	12	12	15
Writing Index	11	16	16	9	14	19

Activity	School 06 Teachers		School 07 Teachers		Overall Average	
	T2106U2	T2306C2	T2107U1	T2207C1	*Transition Math*	Comparison
Reading Index	16	19	15	16	13.8	13.2
Writing Index	13	13	13	12	13.4	13.8

Note: The maximum score on the reading index is 19 and on the writing index is 25.

[a] This teacher created her own materials rather than use a textbook, so questions about reading the text had less applicability to her situation.

The responses from Table 56 appear to align with those from Table 55. Overall, reading and writing indices are roughly comparable for both UCSMP and comparison teachers. Nevertheless, differences in three schools are worth noting. In School 03, the comparison teacher had a higher writing index than the UCSMP teacher; during the interview, she commented, "I see that the kids almost need to write it to seal it in their brain" [Teacher T2303C1]. Even though she had a low reading index, she did have a word wall occupying one part of her classroom with mathematics words visualized in ways to illustrate their meanings.

At School 05, the UCSMP teacher had the much higher writing index. His comparison counterpart indicated that she read and discussed the lesson in class with the students and then made the following comments about writing:

> "I don't think I really do a lot of, as far as like journaling and reflective [writing], and that's probably an area that I'm weak on, not that I think of, as far as story problems. That is a weakness. And there are very few story problems in our

[14] The reading index is based on questions 10, 11a, 11b, 11c, and 12 from the end-of-year teacher questionnaire; the writing index is based on questions 13, 14a, 14b, 14c, 14d, 14e, 14f, and 15. Responses were scored as *almost every day* (4), *2-3 times per week* (3), *2-3 times a month* (2), *less than once a month* (1), and *almost never* (0); *daily* (3), *frequently* (2), *seldom* (1), *never* (0); or *very important* (3), *somewhat important* (2), *not very important* (1).

textbook. I would have to say the writing part of it for me, at this point is minimal." [Teacher T2305C1]

Among teachers T2106U1 and T2306C1 at School 06, the comparison teacher had a higher reading and writing index than her UCSMP counterpart; the difference for reading is somewhat surprising because the comparison teacher indicated she rarely expected students to read, although she did expect them to write daily about the processes they were using. Likewise, in the second pair at School 06, the comparison teacher commented:

"When I do writing exercises, it's usually with a partner, so that they're working something out together. And they come up with some kind of final analysis or answer, and it's a shared kind of thing" [Teacher T2306C2].

The items that formed the reading and writing indices were also asked of students on the *Student Information Form* administered near the end of the school year. As indicated in Chapter 2, it was not possible to obtain student names on this form to tie responses to the students who completed all pretest and posttest instruments. However, students were asked if they were in the given class at the beginning of the school year and when they received their first report card. Responses were only analyzed for those students who responded positively to both questions, under the assumption that these students were likely to be those who would be in the final sample in terms of taking all instruments. Students' responses to the items forming the reading and writing indices are reported in Tables 57, 58, and 59, with the percent corresponding to the teacher response underlined to aid in comparing students' and teachers' perceptions.[15]

As indicated in Table 57, *Transition Mathematics* students reported that their teachers regularly expected them to read their text and over half reported regularly doing so. Among the comparison students, slightly more than a third reported actually reading their textbook at least 2-3 times per week. In particular, comparison students in School 03 read rarely, reflecting the use of teacher created materials rather than a textbook in these classes.

In general, both groups of students believed it was important to read their mathematics textbook in order to understand mathematics, with 71% of both UCSMP and comparison students reporting it as *very important* to read to understand mathematics. In terms of writing, about three-fourths of the UCSMP students believed it important to write about mathematics to show understanding; slightly more comparison students had this belief. Students' beliefs about the importance of reading and writing were generally in tune with their teachers' perceptions about the importance of these practices.

The results in Table 58 provide students' and teachers' perspectives on particular reading strategies used during the year. Both groups of students reported daily listening to the teacher read aloud. However, UCSMP students were more likely than comparison students to report that they daily read silently in class (57% vs. 29%) and daily discussed the reading in class (71% vs. 43%).

The UCSMP students were more likely than comparison students to report regularly (i.e., daily or frequently) writing just answers (64% vs. 42%). In contrast, UCSMP students were less likely than comparison students to report regularly writing complete solutions (73% vs. 84%) or to explain or justify their work (47% vs. 71%). About three-fifths of both groups reported

[15] Overall averages in the student response tables are based on using the student, rather than the class, as the unit of analysis.

Table 57. Distribution (by Percent) of Students in Each Class Reporting Various Reading and Writing Practices: Matched Pairs Study

Frequency/ Importance	School 03 Classes								School 05 Classes	
	UCSMP 004 *n* = 12	Comp 009 *n* = 17	UCSMP 005 *n* = 10	Comp 010 *n* = 16	UCSMP 006 *n* = 13	Comp 011 *n* = 15	UCSMP 007 *n* = 16	Comp 008 *n* = 14	UCSMP 015 *n* = 7	Comp 016 *n* = 7
How often did your teacher expect you to read your mathematics textbook?										
every day	75		70		54		69	7	71	0
2-3 times/wk	25		30	19	31		31			43
2-3 times/mo		18		19	8	33		36		14
<1 per month		18				33		43		29
almost never		59		63	8	27		14	29	14
How often did you actually read your textbook?										
every day					31		31		43	
2-3 times/wk	25		50		15		31		14	14
2-3 times/mo	25	18	30	19	23	33	13			14
<1 per month	25	18		13	7	33		43	14	29
almost never	25	59	20	69	23	33	25	14	29	43
How important do you think it is to read your mathematics text if you want to understand mathematics?										
very	33	18	50	25	85	20	50	50	71	71
somewhat	58	59	50	44	15	67	37	36	29	14
not very	8	12		25		13	13	14		14
How important do you think it is to write about mathematics to show you understand mathematics?										
very	25	24	40	25	54	27	44	29	14	14
somewhat	42	59	30	63	39	60	37	64	57	86
not very	33	6	30	13	8	13	19	7	29	

Note: Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Underlined percentages correspond to the teachers' response for the associated item, when available. Because the comparison teacher at School 03 created her own materials for most of the year, she did not respond to the reading questions. Average is based upon using student, rather than class, as the unit of analysis.

Table 57. (Continued)

Frequency/ Importance	School 06 Classes				School 07 Classes		Overall Average	
	UCSMP 019 *n* = 26	Comp 021 *n* = 20	UCSMP 020 *n* = 25	Comp 022 *n* = 23	UCSMP 025 *n* = 29	Comp 026 *n* = 27	UCSMP *n* = 138	Comp *n* = 139
How often did your teacher expect you to read your mathematics textbook?								
every day	69	50	68	44	86	33	72	22
2-3 times/wk	19	25	4	35	7	33	17	20
2-3 times/mo	4	10	8	9		11	3	17
<1 per month		10	16	4	3	11	4	16
almost never	8	5		9	3	7	4	23
How often did you actually read your textbook?								
every day	35	50	44	39	17	26	27	19
2-3 times/wk	39	30	24	26	24	37	28	17
2-3 times/mo	11	10	8	22	14	15	15	21
<1 per month		5	16	9	17	4	10	16
almost never	15	5	4	4	28	15	20	27
How important do you think it is to read your mathematics text if you want to understand mathematics?								
very	69	85	64	83	45	48	58	51
somewhat	31	10	32	17	48	41	38	36
not very					7	11	4	10
How important do you think it is to write about mathematics to show you understand mathematics?								
very	31	50	32	39	35	19	35	29
somewhat	50	45	52	61	38	56	43	59
not very	19	5	12		28	26	21	10

Note: Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Underlined percentages correspond to the teachers' response for the associated item, when available. Average is based upon using student, rather than class, as the unit of analysis.

Table 58. Distribution (by Percent) of Students in Each Class Reporting on Reading Practices and Their Frequency: Matched Pairs Study

Frequency	School 03 Classes								School 05 Classes	
	UCSMP 004 *n* = 12	Comp 009 *n* = 17	UCSMP 005 *n* = 10	Comp 010 *n* = 16	UCSMP 006 *n* = 13	Comp 011 *n* = 15	UCSMP 007 *n* = 16	Comp 008 *n* = 14	UCSMP 015 *n* = 7	Comp 016 *n* = 7
Teacher reads aloud in class.										
daily	33	18	20	31	39	40	19	7	86	86
frequently	25	35	40	44	8	33	37	50		14
seldom	25	35	40	25	46	20	31	36		
never	17	6			8		13	7	14	
Students read aloud in class.										
daily				6		20				
frequently	17	23	0	31	15	27	13	7	14	14
seldom	42	41	50	37	39	27	13	64		43
never	42	29	50	25	46	20	75	29	86	43
Students read silently in class.										
daily	33	12	20	19	39	20	31	14	57	29
frequently	33	35	60	25	46	20	44	50	14	43
seldom	33	35	10	25	15	40	25	29	29	14
never		12	10	31		13		7		14
Students discussed the reading in class.										
daily	42		20	19	15	33	19		71	43
frequently	8	35	30	6	46	20	19	50	14	29
seldom	17	53	30	50	23	20	19	36	14	29
never	25	6	20	19	15	27	37	14		

Note: Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Underlined percentages correspond to the teachers' response for the associated item. Because the comparison teacher at School 03 created her own materials for most of the year, she did not respond to the reading questions. Average is based upon using student, rather than class, as the unit of analysis.

Table 58. (Continued)

Frequency	School 06 Classes				School 07 Classes		Overall Average	
	UCSMP 019 *n* = 26	Comp 021 *n* = 20	UCSMP 020 *n* = 25	Comp 022 *n* = 23	UCSMP 025 *n* = 29	Comp 026 *n* = 27	UCSMP *n* = 138	Comp *n* = 139
Teacher reads aloud in class.								
daily	35	55	92	39	45	37	47	37
frequently	54	40	4	39	24	22	26	35
seldom	11			22	21	30	20	22
never					10	11	7	4
Students read aloud in class.								
daily	11	10	0	4		11	3	7
frequently	50	35	12	57	7	19	17	29
seldom	39	55	64	35	59	37	45	42
never			20	4	35	33	35	21
Students read silently in class.								
daily	19	25	20	33	10	37	24	23
frequently	46	25	36	43	41	19	41	31
seldom	31	30	40	35	45	33	32	32
never	4	20			3	11	2	13
Students discussed the reading in class.								
daily	31	45	68	35	28	30	36	26
frequently	42	25	16	61	28	11	27	29
seldom	19	20	12	4	14	26	17	28
never	8	5			31	33	17	14

Note: Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Underlined percentages correspond to the teachers' response for the associated item, when available. Average is based upon using student, rather than class, as the unit of analysis.

Table 59. Distribution (by Percent) of Students in Each Class Reporting on Writing Practices and Their Frequency: Matched Pairs Study

Frequency	School 03 Classes								School 05 Classes	
	UCSMP 004 *n* = 12	Comp 009 *n* = 17	UCSMP 005 *n* = 10	Comp 010 *n* = 16	UCSMP 006 *n* = 13	Comp 011 *n* = 15	UCSMP 007 *n* = 16	Comp 008 *n* = 14	UCSMP 015 *n* = 7	Comp 016 *n* = 7
Students wrote answers only.										
daily		6		13	8	13	25	7	57	29
frequently	25	41	70	31	46	47	13	50	14	57
seldom	50	41	30	50	31	40	56	29	29	14
never	25	6			15		6	14		
Students wrote a few steps in a solution.										
daily	17	23	10	31	15	27	31	14		
frequently	58	47	50	69	46	33	25	71	14	14
seldom	17	18	20		39	27	37	14	57	71
never	8	6	20			13	6		29	14
Students wrote complete solutions.										
daily	42	47	20	50	15	47	25	29	14	
frequently	33	47	40	37	46	33	37	57	29	29
seldom	25		30	13	39	20	13	14	57	57
never			10				19			14
Students explained or justified work.										
daily	8	41	20	50	23	33	19	57		
frequently	42	29	50	19	46	40	25	29	29	14
seldom	42	23	20	19	23	20	37	14	57	43
never	8		10	13	8	7	13		14	43
Students wrote in journals.										
daily		18	10	37		40	13	21		
frequently	8	23		31	8	40	13	36		14
seldom		18	20	6	8	7		36	29	14
never	92	35	70	19	85	13	69	7	71	71
Students did a project.										
daily				6				7	14	
frequently	8	12		6		20	13	29	14	
seldom	8	59	50	50	39	47	6	57	71	29
never	83	23	50	31	62	33	75			71

Table 59. (Continued)

Frequency	School 06 Classes				School 07 Classes		Overall Average	
	UCSMP 019 *n* = 26	Comp 021 *n* = 20	UCSMP 020 *n* = 25	Comp 022 *n* = 23	UCSMP 025 *n* = 29	Comp 026 *n* = 27	UCSMP *n* = 138	Comp *n* = 139
Students wrote answers only.								
daily	46	15		9	52	7	26	11
frequently	31	25	60	13	35	19	38	31
seldom	23	30	25	48	7	37	27	38
never		30	12	30	7	37	8	19
Students wrote a few steps in solutions.								
daily	8	25	16	17	10	15	14	20
frequently	58	40	48	35	48	30	46	42
seldom	35	35	32	39	31	33	33	28
never				9	10	22	7	9
Students wrote complete solutions.								
daily	15	40	24	74	17	48	32	47
frequently	39	45	48	22	41	33	41	37
seldom	39	15	24	4	31	11	30	13
never	8				10	7	7	2
Students explained or justified work.								
daily	11	35	12	39	10	30	13	37
frequently	27	50	36	48	31	26	34	34
seldom	54	15	40	13	31	30	38	21
never	8		8		28	15	13	7
Students wrote in journals.								
daily		5	4	9	3	22	4	19
frequently		15		65		7	3	30
seldom	19	45	8	22	21	11	13	20
never	81	30	84	4	76	59	79	29
Students did a project.								
daily			4		3		2	1
frequently	8		4	9	10	7	7	10
seldom	35	30	28	48	65	78	38	53
never	58	70	60	43	21	15	51	34

regularly writing a few steps in their solutions. Both UCSMP and comparison students and their teachers agreed that writing in journals or completing projects was a rare occurrence.

Comments from some *Transition Mathematics* teachers during the teacher interviews provide insights into their concerns about students' ability to read the textbook and how they engaged students in reading.

> "I expect them to read it. I think the reality of it is the kids that are reading at seventh grade and above they are. I think they are reading it." [Teacher T2103U1]
>
> "We read it through with them because sometimes it's really over their heads. … So most of the time I'll either read the lesson verbatim or I will paraphrase it … and then I tell them, 'go home and read the lesson again, because it's going to help you to do the assignment if you understand it.'" [Teacher T2106U1]
>
> "I expect them to read it, and they almost always read it out loud, either to the class or to their table partners. I like raising the bar, so I don't think it should be changed or lowered, I just think that you have to be really specific with your strategies when you're reading it or it goes over their head. So, that's why we read it out loud." [Teacher T2106U2]
>
> "I expect them to come in … and listen to the presentation. … So my expectation of them reading it [the book] is not really there, but, you know, I do expect them when they go through the Covering the Reading [the name for the *Covering the Ideas* questions in the first two editions] questions to flip back and find the answers if they do not know, you know, the question." [Teacher T2105U1]
>
> "We were originally reading in class, but it ended up just taking up too much time. … Now I assign the reading to them after I go over all the highlights of the section, try to explain the topic to them, try to work some of the problems out." [Teacher T2107U1]

Similarly, UCSMP teachers had comments about having students write:

> "I try to assign more lessons where I pick a problem and they write about it, explain it … "[Teacher T2103U1]
>
> "I expect them to be able to explain their work. So, for instance, on a test, if they miss a problem, I give them a second chance to do that problem, but then they have to give me a written explanation of what they had done wrong the first time, or what they needed to do correctly the second time." [Teacher T2106U1]
>
> "I expect them to use the terms that we're using in the lesson in their writing. And I expect it to be clear, but not complete sentences necessarily – they're allowed to make bulleted lists and charts …" [Teacher T2106U2]

Overall, reading seemed to play a somewhat larger role in the classrooms in the study than writing. Writing seemed to be primarily related to writing a few steps or writing complete solutions to problems. There seemed to be less of the varied types of writing that are often part of the discussion when considering *writing in mathematics* (Countryman, 1992).

Use of Technology

Transition Mathematics (Third Edition) assumes that students have continual access to

graphing calculators, in class and at home, with the capabilities of graphing statistical displays and functions, and making tables and lists. In addition, students were expected to have access to spreadsheets and dynamic geometry systems in class. These technology assumptions are a change from the first two editions, for which only scientific calculators were assumed. UCSMP teachers were provided graphing calculators on loan in sufficient quantities to be able to loan them out to students. Because of the age of students or schools' concerns about financial responsibility, some teachers elected to use the calculators only in class. The following paragraphs describe teachers' reports on technology access for schools participating in the study.

School 03. *Transition Mathematics* students owned their own scientific calculator or had access to a class set. Graphing calculators were available in class, but not used until late in the year; the teacher was concerned with how students would treat them and was surprised when students were more careful with graphing calculators (in terms of dropping them on the floor) than with the scientific calculators. In addition, the teacher was unfamiliar with graphing technology and indicated he was not "Mr. Technology." Comparison students had access to class sets of scientific and graphing calculators.

School 05. UCSMP students used the graphing calculator in class; the teacher was concerned that loaning them to students would lead to their appearing in pawn shops. Comparison students had access to a class set of scientific calculators.

School 06. UCSMP students had access to graphing calculators in class, but they were not loaned overnight. Some UCSMP students had their own scientific or four function calculators. Comparison students had their own scientific calculators or access to a partial class set.

School 07. UCSMP students had access in class to a class set of scientific calculators or the graphing calculators loaned by the project. Comparison students either owned their own scientific calculator or had access to a class set.

On the *Student Information Form*, students were queried about their access to calculators in mathematics class. Students were asked for the calculator model and to indicate whether the calculator could graph equations. Through this question, inferences could be made about access to graphing calculators. Among the UCSMP students, 96% indicated calculator access during class, with 72% indicating the calculator could graph equations. For comparison students, 95% had access to calculators in class, with 43% indicating the calculator could graph equations. Access was slightly less at home, with 82% of UCSMP students and 86% of comparison students having calculator access at home. However, access at home to calculators that could graph equations was much lower (30% vs. 11%, respectively).

On the questionnaires, teachers were asked about the importance of helping students learn to use calculators and computers as tools for learning mathematics. On the final questionnaire, they were also asked to indicate the frequency of calculator use during instruction and how helpful the calculator technology was for student learning; because reports throughout the year indicated little computer use, teachers were not asked to indicate the frequency of use or helpfulness of computer technology. Analogous to the Reading and Writing Indices, a Technology Index was created by summing responses to two questions about the frequency and usefulness of calculator technology. Table 60 reports teachers' responses to the questions about technology use.

Both teachers and students were also asked on the final questionnaire or the *Student Information Form*, respectively, to indicate how frequently calculators were used during mathematics class, how helpful they were, and for what purposes they were used. Table 61 and 62 summarize these responses for students, with the percent corresponding to the teachers' responses to the classroom questions underlined.

Table 60. UCSMP and Comparison Teachers' Responses to the Importance, Frequency, and Helpfulness of Technology Based on the Questionnaires: Matched Pairs Study

Activity	School 03				School 05				School 06			
	T2103U1		T2303C1		T2105U1		T2305C1		T2106U1		T2306C1	
	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End
Help students learn to use a calculator as a tool for learning mathematics	3	2	3	3	2	2	3	3	3	2	2	3
Help students learn to use a computer as a tool for learning mathematics	1	1	2	2	2	2	2	1	2	2	1	1
About how often did students use calculator technology during class	na	4	na	4	na	4	na	4	na	4	na	4
How helpful was calculator technology during class	na	2	na	3	na	3	na	3	na	3	na	3
Technology Index[16]		6		7		7		7		7		7

Activity	School 06				School 07				Overall Average			
	T2106U2		T2306C2		T2107U1		T2307C1		*Transition Math*		Comparison	
	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End	Initial	End
Help students learn to use a calculator as a tool for learning mathematics	3	2	4	3	2	3	2	2	2.6	2.2	2.8	2.8
Help students learn to use a computer as a tool for learning mathematics	2	2	4	3	2	2	1	2	1.8	1.8	2	1.8
About how often did students use calculator technology during class	na	3	na	3	na	3	na	3	na	3.6	na	3.6
How helpful was calculator technology during class	na	2	na	2	na	2	na	2	na	2.4	na	2.6
Technology Index[15]		5		5		5		5		6.0		6.2

Note: Responses for the first two questions were rated using the scale: *of highest importance* (4); *quite important* (3); *somewhat important* (2); and *of little importance* (1). Responses for the third question were rated using the scale: *almost every day* (4), *2-3 times per week* (3), *2-3 times a month* (2), *less than once a month* (1), and *almost never* (0). Responses for the last question were rated: *very important* (3), *somewhat important* (2), *not very important* (1). The maximum score on the Technology Index is 7.

[16] The Technology Index is the sum of the scaled responses for questions 7 and 9 from the End-of-Year Teacher Questionnaire, the third and fourth questions in Table 60.

The results in Table 60 suggest that UCSMP teachers generally considered helping students learn to use calculators as tools to be *somewhat important*, with comparison teachers more likely to indicate *quite important*. In contrast, neither group considered helping students learn to use computers as a tool to be important. Both groups found calculator technology to be somewhat helpful during classroom instruction and reported using calculators at least 2-3 times per week.

Overall, the scores on the Technology Index ranged from 5 to 7 out of 7. The second pair of teachers at School 06 (T2106U2 and T2306C2) and the pair of teachers at School 07 had the lowest Index scores. Lower scores were typically a result of viewing calculators as just *somewhat helpful* rather than *very helpful*.

According to the results in Table 61, students generally used calculators in class and for homework at least 2-3 times per week, with students somewhat more likely to use calculators in class than for homework. Almost all students, both UCSMP and comparison, reported the use of calculators as helpful.

Calculators were typically used in class for checking answers, doing computations, and solving problems. Students reported using calculators at home for the same purposes.

During the interviews and on the Chapter Evaluation Forms, teachers were queried about technology use and students' attitudes toward the use of technology. The following comments reflect some of the thoughts from UCSMP teachers:

> "I think they get excited about technology. It's just kind of a hook that pulls them into it more. And, they don't use their own calculators anyway, but it just allows them to do so much more because they're not slowed down with manually figuring out every problem." [Teacher T2106U1]

> "[Students] loved it, which is how they always react to the opportunity to use technology. I don't think it [graphing calculators] helped their conceptual understanding since the calculator does most of the work, but it helped their motivational level!" [Teacher T2106U1]

> "I think using graphing calculators and showing students how it works is great. But for 8th grade, we have no requirement by the state standards for this learning." [Teacher T2103U1]

UCSMP teachers also expressed some concerns about the use of such expensive calculators:

> "I had students who could use the calculator to graph but did not make the connection [to] a table chart or coordinate points." [Teacher T2107U1]

Comparison teachers also made some comments about technology:

> "No matter what they're doing I have them show their work. So, for me the calculators basically are a tool for them to use just to verify that what they're doing is correct." [Teacher T2305C1]

> "Well, I think it's [calculator technology] very influential. It makes the computation part of the equation so much easier for the students. For instance, when we were squaring those numbers yesterday, if they would have had to do that on their own, it would take a lot longer. And I wouldn't have been able to get through as much content area." [Teacher T2306C1]

Table 61. Distribution (by Percent) of Students in Each Class Reporting Frequency and Helpfulness of Calculator Technology: Matched Pairs Study

Frequency/ Helpfulness	School 03 Classes								School 05 Classes	
	UCSMP 004 *n* = 12	Comp 009 *n* = 17	UCSMP 005 *n* = 10	Comp 010 *n* = 16	UCSMP 006 *n* = 13	Comp 011 *n* = 15	UCSMP 007 *n* = 16	Comp 008 *n* = 14	UCSMP 015 *n* = 7	Comp 016 *n* = 7
About how often did you use this calculator in your mathematics class?										
every day	92	65	90	69	92	87	63	71	100	100
2-3 times/wk	8	29	10	31	8	7	19	29		
2-3 times/mo						7	6			
<1 per month										
almost never										
About how often did you use a calculator for homework?										
every day	75	29	70	31	54	27	44	44	29	29
2-3 times/wk	17	23	10	37	31	33	19	57		14
2-3 times/mo	8	23		6		20	6	7		14
<1 per month		6				13				29
almost never										
How helpful was the use of this calculator in learning mathematics in your mathematics class?										
very	83	71	70	94	85	53	75	93	86	86
somewhat	17	23	30	6	8	47	13	7		14
not very										
How helpful was the use of this calculator in learning mathematics during homework?										
very	83	59	60	56	61	33	37	64	29	57
somewhat	17	23	20	19	23	60	31	21		29
not very										

Note: Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Underlined percentages correspond to the teachers' response for the associated item, when available.

Table 61. (Continued)

Frequency/ Helpfulness	School 06 Classes				School 07 Classes		Overall Average	
	UCSMP 019	Comp 021	UCSMP 020	Comp 022	UCSMP 025	Comp 026	UCSMP	Comp
	n = 26	*n* = 20	*n* = 25	*n* = 23	*n* = 29	*n* = 27	*n* = 138	*n* = 139
About how often did you use this calculator in your mathematics class?								
every day	23	30	32	57	35	44	53	60
2-3 times/wk	42	35	44	44	38	37	28	30
2-3 times/mo	27	15	12		21	7	12	4
<1 per month		5	8		7	4	3	1
almost never	4					4	1	1
About how often did you use a calculator for homework?								
every day	27	45	44	39	59	37	49	34
2-3 times/wk	46	25	24	35	24	26	25	32
2-3 times/mo	19	10	12	22	10	11	9	14
<1 per month		5		4	3	4	1	6
almost never						7		1
How helpful was the use of this calculator in learning mathematics in your mathematics class?								
very	69	65	68	78	55	59	70	73
somewhat	23	15	28	22	31	30	22	22
not very	4	5			14	7	4	2
How helpful was the use of this calculator in learning mathematics during homework?								
very	69	60	60	83	66	52	61	59
somewhat	19	20	16	17	24	26	20	26
not very	4	5	4		7	7	3	2

Note: Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Underlined percentages correspond to the teachers' response for the associated item, when available. Average is based upon using student, rather than class, as the unit of analysis.

Table 62. Distribution (by Percent) of Students in Each Class Reporting Use of Calculators for Various Purposes in Class and on Homework: Matched Pairs Study

Purpose	School 03 Classes								School 05 Classes	
	UCSMP 004 *n*=12	Comp 009 *n*=17	UCSMP 005 *n*=10	Comp 010 *n*=16	UCSMP 006 *n*=13	Comp 011 *n*=15	UCSMP 007 *n*=16	Comp 008 *n*=14	UCSMP 015 *n*=7	Comp 016 *n*=7
For what did you use this calculator in your mathematics class?										
checking answers	92	82	100	100	85	87	81	86	86	100
doing computations	75	35	50	69	23	60	31	43	71	43
solving problems	92	82	100	88	85	87	75	93	86	100
graphing equations	8	41	0	75	8	67	25	79	86	0
working with a spreadsheet	25	29	10	44	39	33	13	14	43	29
making tables	17	53	0	44	31	53	19	64	43	43
analyzing data	8	35	0	63	23	53	0	57	14	29
finding equations to model data	25	35	10	37	39	40	19	50	14	43
For what did you use this calculator for homework?										
checking answers	92	82	80	75	77	87	63	86	29	86
doing computations	75	18	40	37	8	33	19	36	29	29
solving problems	100	59	80	63	85	93	63	86	29	86
graphing equations	0	12	0	13	0	0	6	14	29	14
working with a spreadsheet	17	18	10	13	15	13	6	7	29	0
making tables	0	12	0	13	23	7	6	21	29	14
analyzing data	17	23	10	19	23	0	0	14	0	14
finding equations to model data	25	18	10	6	31	0	0	36	0	29

Note: Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Underlined percentages correspond to the teachers' response for the associated item.

Table 62. (Continued)

Purpose	School 06 Classes				School 07 Classes		Overall Average	
	UCSMP 019 $n = 26$	Comp 021 $n = 20$	UCSMP 020 $n = 25$	Comp 022 $n = 23$	UCSMP 025 $n = 29$	Comp 026 $n = 27$	UCSMP $n = 138$	Comp $n = 139$
For what did you use this calculator in your mathematics class?								
checking answers	85	70	80	100	100	74	88	86
doing computations	81	30	56	43	41	37	54	44
solving problems	81	60	92	91	83	85	86	84
graphing equations	19	0	52	13	62	7	35	32
working with a spreadsheet	19	5	32	26	31	0	26	20
making tables	19	15	36	26	35	15	26	35
analyzing data	23	20	36	26	62	15	27	35
finding equations to model data	31	25	28	39	45	22	30	35
For what did you use this calculator for homework?								
checking answers	81	65	76	96	93	70	78	80
doing computations	77	30	52	39	48	30	48	32
solving problems	85	55	76	91	90	70	80	74
graphing equations	4	5	12	17	55	0	17	9
working with a spreadsheet	4	5	4	17	24	0	12	9
making tables	8	15	8	26	24	19	12	17
analyzing data	15	20	28	30	45	19	22	19
finding equations to model data	31	10	16	26	35	15	22	17

Note: Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Underlined percentages correspond to the teachers' response for the associated item. Average is based upon using student, rather than class, as the unit of analysis.

"I think that I am old fashioned when it comes to calculators, so I know that my premise is if you can't do it in your head, you need the practice, and you need to do it in your head, and do it on paper. Whereas I'm sure [other comparison teacher at this school] probably has a different philosophy, because she has more of a math background, and she doesn't see the reasoning behind it for pre-algebra kids to do that. But I like to have them do it and see it." [Teacher T2306C2]

"The hassle, even when I bring my graphing calculators in, it takes a lot of time." [Teacher T2307C1]

None of the UCSMP teachers reported having access to a dynamic geometry system, and several were not familiar with such software. So, it is unlikely that lessons using such technology were implemented in the manner intended by the developers. The availability of such technology at the middle school level is an issue for future consideration.

On the End-of-Year questionnaire, *Transition Mathematics* teachers had an opportunity to give their opinion about the textbook and its suggestions for technology. Table 63 reports their responses to these items. Generally, teachers reported that the textbook had good suggestions for the use of calculators and their features.

Table 63. UCSMP *Transition Mathematics* Teachers' Responses to the Textbook's Technology Features: Matched Pairs Study

Opinion	Teachers				
	T2103U1	T2105U1	T2106U1	T2106U2	T2107U1
This textbook provides good suggestions for the use of calculators.					
strongly agree/agree	X	X	X	X	X
no opinion					
strongly disagree/ disagree					
This textbook provides good suggestions for the use of graphing features of a calculator.					
strongly agree/agree	X	X	X	X	X
no opinion					
strongly disagree/ disagree					
This textbook provides good suggestions for the use of table features of a calculator.					
strongly agree/agree	X	X	X	X	X
no opinion					
strongly disagree/ disagree					
This textbook provides good suggestions for the use of spreadsheets.					
strongly agree/agree	X	X	X	X	X
no opinion					
strongly disagree/ disagree					

Overall, UCSMP teachers would have liked some professional development related to technology. Many had not used graphing calculators or had not used them for a while and needed to learn how to address the concepts in the book with the technology. (The *Transition Mathematics* textbook attempts to use generic language when describing calculator use, so actual

step-by-step directions for the loaner calculators were not available. However, teachers did have access to a calculator manual.) Of the topics listed on the final questionnaire for which teachers might need refresher work, all UCSMP teachers reported needing work on using a graphing calculator, on using spreadsheets, and on using a dynamic geometry drawing tool.

Homework and Frequency of Tests

On the final questionnaire, teachers were queried about the amount of time they expected their typical student to spend each day on homework; students reported the time they actually spent on homework on the *Student Information Form*. The results are summarized in Table 64, with the percents corresponding to the teachers' responses underlined.

All but one of the UCSMP teachers expected students to spend 31-45 minutes per day on homework; the exception (Teacher T2106U2) expected students to spend 16-30 minutes per day. Most of the UCSMP students reported spending between 16 and 45 minutes per day on homework. Seventh-grade comparison teachers also generally expected students to spend 31-45 minutes per day on homework, except for Teacher T2307C1 who expected 16-30 minutes per day and Teacher T2305C1 who only expected 0-15 minutes per day. The majority of comparison students also reported spending between 16 and 45 minutes per day on homework.

Most schools used a nine-week marking period. The exceptions were School 03, which used a six-week marking period, and School 07, which gave report cards every 10 weeks but progress reports every 5 weeks.

The UCSMP teachers generally used the test provided with the Teacher Notes, sometimes adding, deleting, or modifying questions to fit their needs. Similarly, the comparison teachers used the test accompanying their materials.[17] UCSMP and comparison teachers generally administered two tests per marking period. The exceptions were the two teachers at School 07, where the comparison teacher reported giving three tests and the UCSMP teacher reported giving 15 tests.

[17] Comparison teacher T2303C1 (School 03) did not use a textbook. No information about the tests used was provided by comparison teacher T2307C1 (School 07).

Table 64. Distribution (by Percent) of Students in Each Class Reporting Daily Time Spent on Homework: Matched Pairs Study

Frequency	School 03 Classes								School 05 Classes	
	UCSMP 004 *n* = 12	Comp 009 *n* = 17	UCSMP 005 *n* = 10	Comp 010 *n* = 16	UCSMP 006 *n* = 13	Comp 011 *n* = 15	UCSMP 007 *n* = 16	Comp 008 *n* = 14	UCSMP 015 *n* = 7	Comp 016 *n* = 7
About how much time did you spend, on average, this year on your mathematics homework?										
more than 60 min/day	8	6					6	7		
46-60 min/day		12	20		8		19	14		14
31-45 min/day	42	29		44	77	27	19	21	100	14
16-30 min/day	42	41	80	37	15	40	44	50		29
0-15 min/day	8	6		19		33	13	7		43

Frequency	School 06 Classes				School 07 Classes		Overall Average	
	UCSMP 019 *n* = 26	Comp 021 *n* = 20	UCSMP 020 *n* = 25	Comp 022 *n* = 23	UCSMP 025 *n* = 29	Comp 026 *n* = 27	UCSMP *n* = 138	Comp *n* = 139
About how much time did you spend, on average, this year on your mathematics homework?								
more than 60 min/day			4		3	11	3	4
46-60 min/day	15	10	12	9		7	9	8
31-45 min/day	35	45	24	35	28	30	35	32
16-30 min/day	27	40	44	35	55	37	41	39
0-15 min/day	23	5	12	22	14	11	12	16

Note: Percentages may not add to 100 because of rounding, and because some students failed to respond to some items. Underlined percentages correspond to the teachers' response for the associated item. Average is based on using student, rather than class, as the unit of analysis.

UCSMP Teachers' Use of Supplementary Materials

On the Chapter Evaluation Forms, UCSMP teachers regularly indicated whether they used any supplementary materials. (See Appendix G for summaries of responses by chapter.) In general, most teachers did not use supplementary materials, although teachers T2103U1 and T2107U1 occasionally created a sheet for additional practice.

Transition Mathematics Teachers' Perceptions about the Textbook

As previously indicated, one purpose of the evaluation study was to determine potential changes that needed to be made in the text prior to commercial publication. The Chapter Evaluation Forms were summarized for the author team during revision, and teachers regularly reported about specific aspects of the chapters or particular approaches used in a chapter. Summaries of responses to the lessons and particular features of each chapter can be found in Appendix G.

In addition to the chapter evaluations, teachers also responded to a series of questions about the textbook on the end-of-year questionnaire. Table 65 summarizes teachers' responses to these items. As the results indicate, teachers generally responded positively to the textbook and its features. Two of the teachers thought the textbook needed more work with skills.

All but Teacher T2107U1 would use the *Transition Mathematics* textbook again if given the choice. The comments below summarize reasons for and against using the textbook:

> "Yes, I like the clear explanations and logical progression." [Teacher T2106U1]
>
> "Yes, excellent math content, concepts seem to be explained with best practices in mind and the content aligns very well with our state grade level expectations." [Teacher T2106U2]
>
> "No, too many errors and not enough examples. Plus I feel the vocabulary was too much for this age. Needs more skill development." [Teacher T2107U1]

Revisions for commercial publication based on teacher and student perspectives are discussed in Chapter 7.

Table 65. UCSMP *Transition Mathematics* Teachers' Responses to Features about the Textbook: Matched Pairs Study

Opinion	Teachers				
	T2103U1	T2105U1	T2106U1	T2106U2	T2107U1
This textbook helps develop problem-solving skills.					
strongly agree/agree	X		X	X	X
no opinion					
strongly disagree/disagree		X			
This textbook needs more exercises for practice of skills.					
strongly agree/agree				X	X
no opinion					
strongly disagree/disagree	X	X	X		
This textbook explains concepts clearly.					
strongly agree/agree	X	X	X	X	
no opinion					
strongly disagree/disagree					X
This textbook provides good suggestions for activities.					
strongly agree/agree	X	X	X	X	X
no opinion					
strongly disagree/disagree					
This textbook provides good suggestions for assignments.					
strongly agree/agree	X	X	X	X	X
no opinion					
strongly disagree/disagree					
This textbook needs more examples of the applications of mathematics.					
strongly agree/agree		X			X
no opinion				X	
strongly disagree/disagree	X		X		

Summary

This chapter has focused on the implementation of the curriculum and the instructional environment in the classes participating in the Evaluation Study of UCSMP *Transition Mathematics* (Third Edition, Field-Trial Version). Sixteen classes of seventh-grade students formed eight matched pairs of classes in four schools.

Overall, UCSMP *Transition Mathematics* and non-UCSMP comparison teachers implemented curricula with many similarities in terms of content. All students had opportunities to study integer and rational number operations, basic geometry, and basic equation solving and work with variables. UCSMP students at School 03 also studied linear equations and inequalities and their graphs. Non-UCSMP students were more likely to study statistical graphs.

UCSMP teachers generally taught lessons in order, getting as far as possible in the book before the school year ended. All but three teachers taught 100% of the lessons in Chapters 1-8; the teacher at School 05 taught 97% of these lessons, the teacher at School 03 taught 87% because he regularly omitted a lesson or two per chapter, and one of the UCSMP teachers at School 06 taught 63% of these lessons because she missed a number of days during the year for personal health reasons. Comparison teachers taught 40-55% of their respective textbook.

In terms of exercises assigned for practice, UCSMP teachers typically assigned more than 90% of the *Covering the Ideas* questions in the lessons they taught; all but two teachers assigned more than 90% of the *Applying the Mathematics* questions in these lessons. However, three teachers assigned fewer than 50% of the *Review* questions designed to help students develop mastery of important concepts. The limited review has the potential to limit students' opportunities to learn mathematics. Comparison teachers assigned 8-54% of the questions in the lessons they taught, often using supplemental worksheets for practice.

Because of high-stakes testing, some UCSMP and comparison teachers used materials not in their respective textbook to review for testing from 0 to 6 weeks. Two of the UCSMP teachers felt the text did a good job of preparing students for the exam, so that little additional review was needed.

Most students had 50 to 55 minutes of mathematics instruction daily. The exception occurred for students at School 05 who only had 43 minutes of mathematics instruction each day. These students also had the lowest performance on the pretests.

There was not much difference between UCSMP and comparison teachers in either their plans for the year or the way they were carried out. UCSMP teachers were more likely than comparison teachers to engage students in whole-class instruction and to spend class time reviewing homework. Both groups of teachers had more expectations for students to read their respective text than they had for students to write about mathematics. UCSMP teachers did not expect students to read much on their own; rather, they tended to read aloud in class or to have students read with their peers. Teachers expected students to go back and look at the lessons when they were doing homework.

UCSMP and comparison teachers and students regularly reported using calculator technology, with use reported either daily or 2-3 times per week. Calculator use was primarily for checking answers, doing computations, and solving problems. UCSMP teachers generally reported needing additional support with learning to use a graphing calculator.

Chapter 6

The Achieved Curriculum: Matched Pairs Study

The achievement of the seventh-grade students studying from UCSMP *Transition Mathematics* (Third Edition) or the related non-UCSMP curriculum was assessed at the end of the school year by three instruments (see Appendix D). These students were administered in sixteen classes in eight matched pairs, as indicated in Chapter 2 of this report. Students' mathematics achievement is described in three main sections, corresponding to the three instruments.

Achievement on the *Iowa Algebra Aptitude Test*

The form of the *Iowa Algebra Aptitude Test* (*IAAT*) used in this study consists of 63 multiple-choice questions sectioned into four parts. National percentile scores for the *IAAT* are also available, for the entire test and for each part; so, the national percentile equivalents of the scores are reported to compare the achievement of students in this study to national norms. Raw score to percentile conversions are available only for integer scores and the mean raw score was not typically an integer. So, a range of percentile scores is given corresponding to the percentiles for the two integer scores bracketing the mean raw score. Results on the *IAAT* are reported for the entire test as well as for each part. To facilitate comparisons across the four parts of the IAAT and the entire test, scores are reported as both mean raw score and mean percent correct.[18]

Overall Achievement on the *Iowa Algebra Aptitude Test*

Table 66 reports the results on the entire *IAAT*, with Tables 67-70 then reporting the results for each of the four parts. Because five different comparisons were being made on the means of the matched pairs, a Bonferroni correction (Kleinbaum, Kupper, & Muller 1988) was used to lessen the chance that a significant difference would be found by chance; thus, the significance level for the *IAAT* (total and each part) at the pair level was adjusted to $\alpha = 0.05/5 = 0.01$.

On the entire test, the mean number (and percent) of items correct by class varied from 21.6 (34.2%) in the *Transition Mathematics* Class 015 in School 05 to 45.7 (72.6%) in comparison Class 022 in School 06. These levels of achievement correspond to national percentiles from the 6th to 77th percentiles, respectively. With the exception of the results at School 05, the mean percent correct among these seventh-grade students was better than 60%, or between the 53rd to 77th percentiles. As noted in Tables 7 and 8 (Chapter 2), the class means at School 05 were considerably lower than means for other classes on the pretests, and those lower results continued to this posttest.

As noted in Table 66, there were no significant differences between the individual class pair means. Because the classes in each pair within this group were matched on pretest scores, each pair represents a replication of the study. A dependent measures *t*-test on the mean of the pair differences indicates that the non-UCSMP comparison students scored, on average, about 3.4%

[18] The mean percent correct is based on a simple conversion of the raw score to the percent correct. The mean percent is not the same as the national percentile norm.

Table 66. Mean Score, Mean Percent Correct, National Percentile, and Teachers' Reported Opportunity-to-Learn on the *Iowa Algebra Aptitude Test* by Class: Matched Pairs Study

School	*Transition Mathematics*						Comparison									
	Class	*n*	Mean Score (s.d.)	Mean Percent	Natl %-tile	OTL %	Class	*n*	Mean Score (s.d.)	Mean Percent	Natl %-tile	OTL %	SE[a]	*t*	df	*p*
03	004	13	39.9 (10.8)	63.2 (17.1)	55-61	79	009	19	40.0 (10.3)	63.4 (16.4)	61	70	6.01	-0.027	30	0.979
	005	13	43.2 (10.6)	68.5 (16.8)	70-73	79	010	14	40.8 (10.9)	64.7 (17.2)	61-63	70	6.55	0.574	25	0.571
	006	14	39.0 (10.0)	61.9 (15.9)	55	79	011	14	44.5 (10.5)	70.6 (16.6)	73-75	70	6.15	-1.419	26	0.168
	007	14	38.6 (16.8)	61.2 (26.6)	53-55	79	008	17	38.6 (10.0)	61.3 (15.9)	53-55	70	7.72	-0.003	29	0.997
05	015	7	21.6 (9.1)	34.2 (14.5)	6-8	70	016	8	29.4 (6.0)	46.6 (9.5)	23-27	87	6.25	-1.980	13	0.069
06	019	25	39.6 (8.5)	62.8 (13.5)	55-61	92	021	23	43.6 (9.6)	69.2 (15.2)	70-73	91	4.15	-1.533	46	0.132
	020	26	43.4 (5.8)	68.9 (9.2)	70-73	92	022	19	45.7 (7.9)	72.6 (12.5)	75-77	91	3.24	-1.134	43	0.263
07	025	30	43.6 (9.9)	69.2 (15.7)	70-73	91	026	26	43.1 (7.5)	68.4 (11.9)	70-73	83	3.77	0.190	54	0.850
Overall Gr. 7[b]		142	40.4 (10.9)	64.2 (17.3)				140	41.7 (9.8)	66.2 (15.5)						

Note: Maximum score is 63. To convert raw scores to standard scores and percentiles, the two integer raw scores bracketing the mean raw score were used to obtain percentile score ranges. A dependent measures *t*-test indicates that the difference in achievement between students studying from the two sets of curricula, based on the mean of the pair differences (UCSMP – comparison), is not significant: $\bar{x} = -3.36, s_{\bar{x}} = 5.46, t = -1.742, p = 0.125$, with *t*-test measures based on using the mean percent scores. The effect size between the UCSMP and comparison classes is d = -0.281 based on the formula recommended by Dunlap et al. (1996), $d = t_c[2(1 - r)/n]^{1/2}$, with t_c = -1.742 (p = 0.125), r = 0.896, and n = 8, based on UCSMP – comparison.

[a] Based on the mean percent.

[b] The overall results are based on using the student, either all UCSMP or all comparison, as the unit of analysis rather than the class.

better than the UCSMP *Transition Mathematics* students, but this difference was not statistically significant.[19] The difference indicates that comparison students answered, on average, about two items more than the UCSMP *Transition Mathematics* students. The effect size difference was about a quarter of a standard deviation, in favor of the comparison students.

Figure 15 uses boxplots to illustrate the range of scores, in terms of percent correct, for the sixteen classes. The lowest individual score was 17% correct and the highest was 98%, both occurring in UCSMP Class 007, School 03. Although the maximum score in both classes at School 05 was about 61%, the boxplots suggest that the bottom 75% of students in the UCSMP class scored below the first quartile score for students in the matched comparison class. In general, the maximum score for the two classes at School 05 was lower than the mean score for all classes except UCSMP Class 007. Ignoring outliers, the smallest range of scores occurred for UCSMP Class 005 (School 03) and comparison Class 002 (School 06).

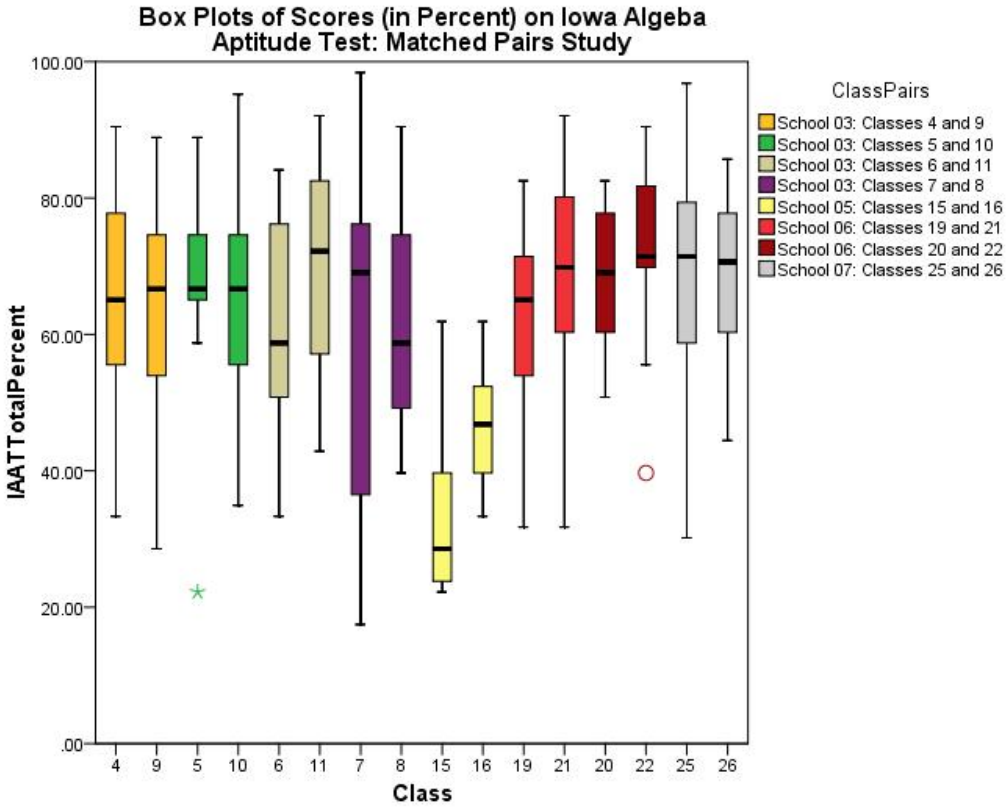


Figure 15. Box Plot of Percent Correct by Class for the *Iowa Algebra Aptitude Test*: Matched Pairs Study (For each pair, the UCSMP class is represented by the left bar in the pair.)

[19] A matched pairs (dependent measures) *t*-test is appropriate in this situation. Because the samples were matched at the beginning of the study, they are considered dependent. A *t*-test on the mean of the differences between the pair means provides a method to test the overall effect of the two curricula (Gravetter & Wallnau, 1985, p. 373).

All teachers reported teaching the content needed to answer all of the items in Parts B and C of the test. As the results in Tables 67-70 indicate, for half of the classes achievement on Part A (interpreting mathematical information) was the lowest among all four parts of the test. Overall achievement differences for students studying from the UCSMP *Transition Mathematics* or comparison curricula were not significant for any of the subtests.

On the final two-thirds of Part A, students needed to read two passages of unfamiliar mathematics content (e.g., matrices to store data) and then answer questions related to that content; teachers generally reported no opportunity to learn the mathematics related to the first of these two passages. On Part A, the mean ranged from 6.6 (36.5%) in UCSMP Class 015, School 05 to 11.2 (62.3%) in comparison Class 011 in School 03, corresponding to the 16th to 67th percentiles, respectively. Omitting the results from School 05, the percentiles on Part A varied from the 34th to the 67th percentiles. In six of the eight pairs, the class mean was somewhat higher for the comparison classes than for the UCSMP classes, although none of the differences between the pair means was significant. The largest differences between pairs occurred for Classes 006 and 011 at School 03 and the two classes at School 05.

On Part B (translating to symbols), students had to identify a numerical or algebraic expression for a verbal problem. Students at School 05 again scored the lowest, with achievement at this school at the 9th to 25th percentiles. Among the other pairs, the mean ranged from 9.2 (61.4%) in comparison Class 010, School 03 to 11.0 (73.3%) in UCSMP Class 020, School 06, corresponding to the 47th to 72nd percentiles, respectively. Again, although none of the differences in the pair means were significant, comparison students scored somewhat higher than UCSMP students in five of the eight pairs. The results suggest that many students in both groups were able to identify the appropriate expression to describe a verbal problem.

Part C (finding relationships) focuses on identifying a rule to describe a relationship in a table on which students generally did quite well. With the exception of the students in both classes at School 05 and the UCSMP students in Class 007, School 03, the mean for these seventh-grade students was between 71% and 88%. Again, there were no significant differences between the pair means, even though the means of the comparison classes were somewhat higher in six of the eight pairs. Overall, students were typically able to identify a rule for a pattern, a topic that is addressed in *Transition Mathematics* as well as in the other seventh-grade curricula.

On Part D (using symbols), students needed to use algebraic relationships among variables, often to solve an equation or simplify an expression. The mean percent correct varied from 60% to 79% when students at School 05 are omitted. In five of the eight pairs, the means of the comparison classes were slightly higher than in the UCSMP classes.

All students at School 05 started the year considerably lower in achievement than the other seventh-grade students. The results suggest that they did not make up the ground or close the achievement gap over the course of the year, often scoring 10-20% lower than their counterparts in other schools. All were minority students. The UCSMP teacher (T2105U1) at this school assigned most of the *Covering the Ideas* problems, about three-fifths of the *Applying the Mathematics* problems, but less than half of the *Review* problems in the lessons taught. The comparison teacher (T2305C1) assigned about 8% of the problems in the lessons of textbook taught, although worksheets were often used for assignments. So, perhaps students had fewer opportunities to practice concepts and work on problems at a deeper level than in classes in other pairs. In addition, these students, who were already behind their peers in the other study schools, had the least amount of time for mathematics instruction each week, studying mathematics for only 43 minutes per day compared to 50-55 minutes per day in the other classes.

Table 67. Mean Score, Mean Percent Correct, National Percentile, and Teachers' Reported Opportunity-to-Learn on the *Iowa Algebra Aptitude Test — Part A* by Class: Matched Pairs Study

School	*Transition Mathematics*						Comparison									
	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	Natl %-tile	OTL %	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	Natl %-tile	OTL %	SE[a]	*t*	df	*p*
03	004	13	9.5 (3.6)	52.6 (20.1)	46-56	72	009	19	9.5 (3.0)	52.6 (16.6)	46-56	39	6.51	-0.010	30	0.992
	005	13	8.4 (3.30	46.6 (18.2)	34-46	72	010	14	9.6 (3.3)	53.2 (18.1)	46-56	39	6.99	-0.944	25	0.354
	006	14	8.1 (2.9)	45.2 (15.8)	34-46	72	011	14	11.2 (3.8)	62.3 (21.1)	67-76	39	7.06	-2.416	26	0.023
	007	14	8.8 (5.2)	48.8 (29.1)	34-46	72	008	17	9.2 (4.0)	51.3 (22.4)	46-56	39	9.24	-0.270	29	0.789
05	015	7	6.6 (3.6)	36.5 (19.7)	16-24	39	016	8	8.5 (3.1)	47.2 (17.3)	34-46	67	9.56	-1.121	13	0.283
06	019	25	8.6 (3.0)	47.8 (16.9)	34-46	72	021	23	9.8 (4.0)	54.6 (22.1)	46-56	72	5.66	-1.204	46	0.235
	020	26	10.1 (2.7)	56.0 (15.0)	56-67	72	022	19	11.0 (3.3)	61.1 (18.2)	67	72	4.96	-1.034	43	0.307
07	025	30	11.0 (3.6)	61.3 (19.8)	67	72	026	26	9.9 (2.9)	54.7 (15.9)	46-56	67	4.85	1.359	54	0.180
Overall Gr. 7[b]		142	9.3 (3.6)	51.8 (19.9)				140	9.9 (3.4)	55.0 (19.1)						

Note: Maximum score is 18. To convert raw scores to standard scores and percentiles, the two integer raw scores bracketing the mean raw score were used to obtain percentile score ranges. A dependent measures *t*-test indicates that the difference in achievement between students studying from the two sets of curricula, based on the mean of the pair differences (UCSMP – comparison), is not significant: $\bar{x} = -5.28, s_{\bar{x}} = 7.07, t = -2.110, p = 0.073$, with *t*-test measures based on using the mean percent scores. The effect size between the UCSMP and comparison classes is d = -0.810 based on the formula recommended by Dunlap et al. (1996), $d = t_c[2(1 - r)/n]^{1/2}$, with t_c = -2.11 (p = 0.073), r = 0.411, and n = 8.

[a] Based on the mean percent.

[b] The overall results are based on using the student, either all UCSMP or all comparison, as the unit of analysis rather than the class.

Table 68. Mean Score, Mean Percent Correct, National Percentile, and Teachers' Reported Opportunity-to-Learn on the *Iowa Algebra Aptitude Test — Part B* by Class: Matched Pairs Study

School	*Transition Mathematics*						Comparison						SE[a]	*t*	df	*p*
	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	Natl %-tile	OTL %	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	Natl %-tile	OTL %				
03	004	13	9.2 (2.8)	61.5 (18.5)	47-61	100	009	19	9.5 (3.1)	63.2 (20.5)	47-61	100	7.11	-0.228	30	0.821
	005	13	10.5 (3.2)	70.3 (21.2)	61-72	100	010	14	9.2 (3.4)	61.4 (23.0)	47-61	100	8.53	1.035	25	0.310
	006	14	9.8 (2.8)	65.2 (18.9)	47-61	100	011	14	10.5 (2.8)	70.0 (18.4)	61-72	100	7.06	-0.675	26	0.506
	007	14	10.0 (4.1)	66.7 (27.5)	61	100	008	17	9.3 (2.5)	62.0 (17.0)	47-61	100	8.06	0.584	29	0.564
05	015	7	5.3 (1.6)	35.2 (10.7)	9-16	100	016	8	6.5 (1.9)	43.3 (12.3)	16-25	100	6.01	-1.347	13	0.201
06	019	25	9.4 (2.2)	62.4 (14.9)	47-61	100	021	23	10.1 (2.5)	67.2 (16.6)	61-72	100	4.54	-1.067	46	0.291
	020	26	11.0 (1.9)	73.3 (12.5)	72	100	022	19	10.4 (2.9)	69.5 (19.0)	61-72	100	4.70	0.821	43	0.416
07	025	30	9.8 (3.2)	65.6 (21.2)	47-61	100	026	26	10.0 (2.7)	66.9 (17.8)	61	100	5.28	-0.259	54	0.796
Overall Gr. 7[b]		142	9.8 (3.0)	65.1 (19.9)				140	9.7 (2.8)	64.6 (19.0)						

Note: Maximum score is 15. To convert raw scores to standard scores and percentiles, the two integer raw scores bracketing the mean raw score were used to obtain percentile score ranges. A dependent measures *t*-test indicates that the difference in achievement between students studying from the two sets of curricula, based on the mean of the pair differences (UCSMP – comparison), is not significant: $\bar{x} = -0.41, s_{\bar{x}} = 5.74, t = -0.203, p = 0.845$, with *t*-test measures based on using the mean percent scores. The effect size between the UCSMP and comparison classes is d = -0.035 based on the formula recommended by Dunlap et al. (1996), $d = t_c[2(1 - r)/n]^{1/2}$, with t_c = -0.203 (p = 0.845), r = 0.884, and n = 8.

[a] Based on the mean percent.

[b] The overall results are based on using the student, either all UCSMP or all comparison, as the unit of analysis rather than the class.

Table 69. Mean Score, Mean Percent Correct, National Percentile, and Teachers' Reported Opportunity-to-Learn on the *Iowa Algebra Aptitude Test — Part C* by Class: Matched Pairs Study

School	*Transition Mathematics*						Comparison									
	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	Natl %-tile	OTL %	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	Natl %-tile	OTL %	SE[a]	*t*	df	*p*
03	004	13	11.2 (3.9)	74.9 (26.0)	70-78	100	009	19	11.0 (3.3)	73.3 (22.0)	70	100	8.52	0.181	30	0.858
	005	13	13.0 (2.9)	86.7 (19.1)	85	100	010	14	12.4 (3.1)	82.4 (20.9)	78-85	100	7.71	0.556	25	0.583
	006	14	10.7 (3.7)	71.4 (24.7)	62-70	100	011	14	12.3 (2.3)	81.9 (15.3)	78-85	100	7.78	-1.347	26	0.190
	007	14	9.7 (4.8)	64.8 (32.3)	54-62	100	008	17	11.1 (3.0)	73.7 (19.8)	70-78	100	9.43	-0.950	29	0.350
05	015	7	3.7 (3.1)	24.8 (20.6)	5-11	100	016	8	7.1 (2.5)	47.5 (16.9)	35-45	100	9.68	-2.349	13	0.035
06	019	25	11.4 (2.7)	75.7 (18.2)	70-78	100	021	23	12.2 (2.7)	81.4 (17.9)	78-85	100	5.22	-1.095	46	0.279
	020	26	11.7 (2.1)	78.2 (14.1)	70-78	100	022	19	12.5 (2.6)	83.2 (17.4)	78-85	100	4.69	-1.056	43	0.297
07	025	30	12.3 (3.0)	82.2 (20.1)	78-85	100	026	26	13.2 (2.3)	88.2 (15.4)	85-92	100	4.83	-1.238	54	0.221
Overall Gr. 7[b]	U	142	11.2 (3.7)	74.5 (24.4)			C	140	11.9 (3.0)	79.1 (20.1)						

Note: Maximum score is 15. To convert raw scores to standard scores and percentiles, the two integer raw scores bracketing the mean raw score were used to obtain percentile score ranges. A dependent measures *t*-test indicates that the difference in achievement between students studying from the two sets of curricula, based on the mean of the pair differences (UCSMP – comparison), is not significant: $\bar{x} = -6.61, s_{\bar{x}} = 8.19, t = -2.284, p = 0.056$, with *t*-test measures based on using the mean percent scores. The effect size between the UCSMP and comparison classes is d = -0.245 based on the formula recommended by Dunlap et al. (1996), $d = t_c[2(1 - r)/n]^{1/2}$, with t_c = -2.284 (p = 0.056), r = 0.954, and n = 8.

[a] Based on the mean percent.

[b] The overall results are based on using the student, either all UCSMP or all comparison, as the unit of analysis rather than the class.

Table 70. Mean Score, Mean Percent Correct, National Percentile, and Teachers' Reported Opportunity-to-Learn on the *Iowa Algebra Aptitude Test — Part D* by Class: Matched Pairs Study

School	*Transition Mathematics*						Comparison									
	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	Natl %-tile	OTL %	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	Natl %-tile	OTL %	SE[a]	*t*	df	*p*
03	004	13	9.9 (3.0)	66.2 (20.1)	55-65	47	009	19	10.0 (2.5)	66.7 (16.6)	65	47	6.51	-0.079	30	0.938
	005	13	11.2 (2.5)	74.9 (16.6)	76-87	47	010	14	9.6 (3.8)	64.3 (25.2)	55-65	47	8.27	1.280	25	0.212
	006	14	10.4 (2.4)	69.0 (15.8)	65-76	47	011	14	10.5 (3.0)	70.0 (19.9)	65-76	47	6.79	-0.140	26	0.890
	007	14	10.1 (4.5)	67.1 (30.0)	65-76	47	008	17	9.0 (2.4)	60.0 (16.3)	55	47	8.46	0.844	29	0.406
05	015	7	6.0 (2.9)	40.0 (19.6)	25	47	016	8	7.3 (2.3)	48.3 (15.4)	34-44	87	9.05	-0.920	13	0.374
06	019	25	10.2 (2.9)	68.3 (19.3)	65-76	100	021	23	11.4 (3.0)	76.2 (20.2)	76-87	93	5.70	-1.398	46	0.169
	020	26	10.6 (2.4)	70.8 (16.0)	65-76	100	022	19	11.8 (2.2)	78.9 (14.6)	76-87	93	4.66	-1.755	43	0.086
07	025	30	10.4 (2.4)	69.1 (16.3)	65-76	93	026	26	10.0 (3.1)	66.7 (20.5)	65	67	4.92	0.497	54	0.621
Overall Gr. 7[b]		142	10.2 (3.0)	67.9 (19.7)				140	10.2 (3.0)	68.1 (20.1)						

Note: Maximum score is 15. To convert raw scores to standard scores and percentiles, the two integer raw scores bracketing the mean raw score were used to obtain percentile score ranges. A dependent measures *t*-test indicates that the difference in achievement between students studying from the two sets of curricula, based on the mean of the pair differences (UCSMP – comparison), is not significant: $\bar{x} = -0.71, s_{\bar{x}} = 7.20, t = -0.280, p = 0.788$, with *t*-test measures based on using the mean percent scores. The effect size between the UCSMP and comparison classes is d = -0.070 based on the formula recommended by Dunlap et al. (1996), $d = t_c[2(1 - r)/n]^{1/2}$, with t_c = -0.280 (p = 0.788), r = 0.753, and n = 8.

[a] Based on the mean percent.

[b] The overall results are based on using the student, either all UCSMP or all comparison, as the unit of analysis rather than the class.

Achievement on the Fair Tests from the *Iowa Algebra Aptitude Test*

Table 71 reports the results on the *Fair Test* for each school; as previously mentioned, this test controls for opportunity to learn at the school level by focusing on achievement using only those items for which the teacher or pair of teachers reported having taught the necessary content. Only for the pair at School 05 was the difference between the class means significant. Although the comparison means were slightly higher in six of the eight pairs, overall there was no significant difference in achievement among the seventh-grade students using the UCSMP *Transition Mathematics* or non-UCSMP comparison curricula.

As might be expected, the percentage of questions answered correctly was generally somewhat higher on the *Fair Test* of the *IAAT* than on the overall *IAAT*. Omitting the results from School 05, the mean percent correct varied from 62.7% (UCSMP Class 019, School 06) to 79.5% (UCSMP Class 005, School 03). For students at School 05, the class mean of the comparison students was more than 15% higher than for the UCSMP students. In all other pairs, the difference in achievement between the class means was less than 8.5%.

In general, the means for the classes in each pair differed by less than 10%. The only exception occurred at School 05, where the difference was about 18% and achievement was the lowest among all students.

Achievement on the Conservative Test from the *Iowa Algebra Aptitude Test*

Table 72 reports the results of the *Conservative Test* which controls for opportunity to learn across all the classes of the group; thus, the teacher who reports covering the least amount of content strongly influences the Conservative Test. The Conservative Test consisted of roughly two-thirds of the items on the test, with all the items from Parts B and C but only one-third of the items from Part A and two-fifths of the items from Part D.

The mean percent correct varied from 67.2% (UCSMP Class 007, School 03) to 81.0% (UCSMP Class 005, School 03) when the results from School 05 are omitted. At School 05, achievement was about 20-30% lower than in the other classes.

In general, the means for the classes in each pair differed by less than 10%, except at School 05 where the difference was about 18%. Only at School 05 was the difference in class means significant. Nevertheless, again there was no significant difference overall in achievement between students studying from *Transition Mathematics* or the comparison curricula.

Table 71. Mean Percent Correct on the Fair Tests of the *Iowa Algebra Aptitude Test* by Class: Matched Pairs Study[a]

School	*Transition Mathematics*				Comparison							
	Class	*n*	Mean Percent	s.d.	Class	*n*	Mean Percent	s.d.	SE	*t*	df	*p*
03	004	13	70.8	17.5	009	19	68.4	18.9	6.60	0.361	30	0.721
	005	13	79.5	16.9	010	14	71.4	18.0	6.73	1.206	25	0.239
	006	14	70.6	17.2	011	14	76.1	16.0	6.28	-0.879	26	0.387
	007	14	66.9	27.3	008	17	67.5	15.5	7.81	-0.081	29	0.936
05	015	7	32.6	13.8	016	8	50.3	11.0	6.40	-2.770	13	0.016*
06	019	25	62.7	12.8	021	23	69.9	14.6	3.95	-1.824	46	0.075
	020	26	68.2	9.5	022	19	72.8	12.2	3.23	-1.425	43	0.161
07	025	30	72.4	16.0	026	26	72.5	11.0	3.73	-0.030	54	0.976

Note: * indicates significant differences between the classes at the pair level. Items comprising each *Fair Test* are as follows: for School 03, 44 items (A1, A2, A4-A7, A18, B1-B15, C1-C15, D2-D8); for School 05, 43 items (A1-A7, B1-B15, C1-C15, D2-D6, D8); for both pairs at School 06, 57 items (A1-A7, A13-A18, B1-B15, C1-C15, D2-D15); for School 07, 52 items (A1-A7, A13-A17, B1-B15, C1-C15, D1-D6, D8-D10, D15).

[a] A dependent measures *t*-test indicates that the difference in achievement between students studying from the two sets of curricula, based on the mean of the pair differences (UCSMP – comparison), is not significant: $\bar{x} = -3.15, s_{\bar{x}} = 7.64, t = -1.166, p = 0.282$., with *t*-test measures based on using the mean percent scores. The effect size between the UCSMP and comparison classes is d = -0.172 based on the formula recommended by Dunlap et al. (1996), $d = t_c[2(1 - r)/n]^{1/2}$, with t_c = -1.166 (p = 0.282), r = 0.913, and n = 8.

Table 72. Mean Percent Correct on the Conservative Test of the *Iowa Algebra Aptitude Test* by Class: Matched Pairs Study[a]

School	*Transition Mathematics*				Comparison							
	Class	*n*	Mean Percent	s.d.	Class	*n*	Mean Percent	s.d.	SE	*t*	df	*p*
03	004	13	72.3	17.1	009	19	69.9	19.0	6.57	0.368	30	0.715
	005	13	81.0	16.8	010	14	72.3	17.9	6.69	1.297	25	0.206
	006	14	73.1	17.1	011	14	77.4	15.3	6.13	-0.694	26	0.494
	007	14	67.2	27.4	008	17	68.3	15.8	7.86	-0.149	29	0.883
05	015	7	32.7	14.1	016	8	50.6	10.9	6.46	-2.779	13	0.016*
06	019	25	70.7	13.3	021	23	76.3	14.9	4.07	-1.383	46	0.173
	020	26	76.6	9.7	022	19	80.3	13.6	3.46	-1.061	43	0.294
07	025	30	75.4	16.3	026	26	78.3	11.4	3.82	-0.758	54	0.451
Overall Gr. 7[b]		142	71.9	18.7		140	73.6	16.3				

Note: * indicates significant differences between the classes at the pair level. Items comprising the *Conservative Test* are as follows: 42 items (A1, A2, A4-A7, B1-B15, C1-C15, D2-D6, D8).

[a] A dependent measures *t*-test indicates that the difference in achievement between students studying from the two sets of curricula, based on the mean of the pair differences (UCSMP – comparison), is not significant: $\bar{x} = -3.05, s_{\bar{x}} = 7.56, t = -1.140, p = 0.292$, with *t*-test measures based on using the mean percent scores. The effect size between the UCSMP and comparison classes is d = -0.172 based on the formula recommended by Dunlap et al. (1996), $d = t_c[2(1 - r)/n]^{1/2}$, with t_c = -1.140 (p = 0.292), r = 0.909, and n = 8.

[b] The overall results are based on using the student, either all UCSMP or all comparison, as the unit of analysis rather than the class.

Summary for the *Iowa Algebra Aptitude Test*

The *IAAT* gives one measures of students' readiness to study algebra. Other factors, such as skills not measured by the *IAAT*, attendance, willingness to complete homework, motivation, and time for mathematics instruction, are also important indicators in determining success in algebra. The technical manual for the *IAAT* reports the percent of students earning various grades in algebra I based on the standard score on the overall test. Except for students at School 05, the majority of students finishing *Transition Mathematics* or the comparison courses should have been prepared for an algebra course. According to Schoen and Ansley (1993), the results suggest that about two-fifths of the students would be expected to earn at least a B in the first semester of algebra I and slightly more than a third would be expected to earn such grades during second semester.

The system in which School 05 resides was attempting to make improvements in their mathematics program. In particular, they were working to move *Transition Mathematics* from the high school down to the middle school and raise the mathematical expectations for students. They were expecting that, in the first year of this endeavor, many students would need to repeat a prealgebra course in eighth grade. The results from the *IAAT* would suggest this might be an appropriate course of action, and that most students were not quite ready to move to an algebra course after completing UCSMP *Transition Mathematics* or the non-UCSMP comparison curriculum (i.e., Scott Foresman *Middle School Math: Course 2*).

Because research indicates that an important predictor of future achievement is prior achievement (Begle, 1973; Bloom, 1976) and students' opportunities to learn also influence achievement, multiple regression was used to predict achievement based on several factors. In particular, would posttest opportunity to learn and curriculum type (UCSMP or comparison) predict achievement on the IAAT when prerequisite knowledge, as measured by the pretests, is controlled? Assumptions of normality were checked, with skewness and kurtosis within acceptable ranges.

Achievement on the IAAT was examined using four predictor variables: the *TerraNova* CAT survey (a standardized pretest); the *Middle School Mathematics Test* (a UCSMP constructed pretest); the *IAAT* Posttest Opportunity-to-Learn; and curriculum type. The dependent variable of *IAAT* achievement and the first three predictor variables are reported as a percent; curriculum type is a dummy variable with the UCSMP curriculum coded as 1 and the comparison curriculum coded as 0. Table 73 reports the coefficients of the predictor variables and their significance.

For the *Iowa Algebra Aptitude Test*, the two pretests were significant predictors of achievement. While teachers' reported opportunity to learn on the *IAAT* was close to reaching significance, curriculum type was not significant. Together the model accounts for 60% of the variance in the data.

Table 73. Unstandardized Regression Coefficients and Significance for Model Predicting Achievement on the *Iowa Algebra Aptitude Test* from Pretest Knowledge, Posttest Opportunity to Learn, and Curriculum

Predictor Variable	β	*t*	*p*
Constant	28.877	4.671	< 0.001*
TerraNova CAT Survey (Pretest)	0.425	8.227	< 0.001*
Middle School Mathematics Test (Pretest)	0.367	6.679	< 0.001*
IAAT Opportunity to Learn	-0.148	-1.822	0.070
Curriculum Type (UCSMP = 1)	-1.691	-1.253	0.211

Note: Collinearity was tested for the predictor variables and was not an issue.
$F(4, 281) = 104.748$, $p < 0.000$, $R^2 = 60.2\%$.

Achievement on the *Algebra/Geometry Readiness Test: Part One*

The *Algebra/Geometry Readiness Test: Part One* is a 40 item multiple-choice test constructed by UCSMP personnel. Twenty-four of the items were repeated from the pretest to assess mathematical growth over the course of the year.

Overall Achievement on the *Algebra/Geometry Readiness Test: Part One*

Table 74 reports the mean and mean percent correct on the entire *Algebra/Geometry Readiness Test: Part One*. The mean score varies from 13.0 (32.5%) in UCSMP Class 015, School 05 to 27.5 (68.7%) in UCSMP Class 020, School 06. Again, the results from the two classes at School 05 are lower than those for the other classes in the matched pairs, with the mean of the UCSMP class about 25% lower than the means of the other UCSMP classes. When the results from School 05 are omitted, the mean percent correct varies from 21.2 (52.9%) in comparison Class 008, School 03 to 27.5 (68.7%) in UCSMP Class 020, School 06.

There were no significant differences between the individual pair means, with the difference between means of the class pairs generally less than 10%. Overall, a dependent-measures *t*-test on the mean of the pair differences indicates no significant difference in overall achievement for students studying from the *Transition Mathematics* or comparison curriculum. In general, the UCSMP students in each pair scored slightly higher than their non-UCSMP counterpart, with the exception of the pair at School 05 and the first pair at School 06 (Classes 019 and 021). In the case of the four pairs at School 03, the slightly better achievement by UCSMP students might be influenced by the higher OTL percentage for the UCSMP classes. For the first pair in School 06, the UCSMP and comparison teacher both reported teaching the content for 95% of the test items. Interestingly, the comparison teacher at School 05 (T2305C1) had a higher OTL percentage than the UCSMP teacher (T2105U1), and her students had correspondingly higher achievement.

Figure 16 illustrates the range of scores, in terms of percent correct, for the classes in the study. This figure again highlights the fact that the scores at School 05 are considerably lower than those of the other seventh-grade students, who tend to be within the same overall range; in fact, all students in the UCSMP class (015) score below the first quartile of students in the comparison class (016). The greatest range occurred in UCSMP Class 005 (School 03), from a minimum of 0 to a maximum of 33. In general, scores ranged from 7 (17.5%) to 36 (90%).

Table 74. Mean Score, Mean Percent Correct and Teachers' Reported Opportunity-to-Learn on the *Algebra/Geometry Readiness Test — Part One* by Class: Matched Pairs Study

School	*Transition Mathematics*					Comparison					SE[a]	*t*	df	*p*
	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	OTL %	Class	*n*	Mean Score (s.d.)	Mean Percent (s.d.)	OTL %				
03	004	13	24.1 (7.1)	60.2 (17.8)	95	009	19	22.2 (7.6)	55.5 (18.9)	70	6.65	0.702	30	0.488
	005	13	24.9 (9.2)	62.1 (22.9)	95	010	14	22.9 (5.9)	57.3 (14.7)	70	7.35	0.652	25	0.520
	006	14	25.4 (7.0)	63.4 (17.6)	95	011	14	24.0 (7.3)	60.0 (18.3)	70	6.79	0.500	26	0.621
	007	14	23.2 (9.8)	58.0 (24.6)	95	008	17	21.2 (6.8)	52.9 (17.0)	70	7.48	0.681	29	0.501
05	015	7	13.0 (6.5)	32.5 (16.3)	55	016	8	18.6 (4.1)	46.6 (10.3)	88	6.96	-2.021	13	0.064
06	019	25	24.3 (5.8)	60.8 (14.4)	95	021	23	24.4 (6.4)	61.0 (16.0)	95	4.39	-0.041	46	0.968
	020	26	27.5 (5.7)	68.7 (14.3)	95	022	19	25.5 (5.9)	63.7 (14.8)	100	4.39	1.132	43	0.264
07	025	30	25.9 (5.5)	64.7 (13.8)	100	026	26	24.0 (7.0)	60.0 (17.4)	100	4.18	1.117	54	0.269
Overall Gr. 7[b]		142	24.7 (7.3)	61.7 (18.2)		23.3 (6.7)	140		58.2 (16.7)					

Note: Maximum score is 40. A dependent measures *t*-test indicates that the difference in achievement between students studying from the two sets of curricula, based on the mean of the pair differences (UCSMP – comparison), is not significant: $\bar{x} = 1.68, s_{\bar{x}} = 6.61, t = 0.716, p = 0.497$, with *t*-test measures based on using the mean percent scores. The effect size between the UCSMP and comparison classes is $d = 0.110$ based on the formula recommended by Dunlap et al. (1996), $d = t_c[2(1 - r)/n]^{1/2}$, with $t_c = 0.716$ ($p = 0.497$), $r = 0.905$, and $n = 8$.

[a] Based on the mean percent.

[b] The overall results are based on using the student, either all UCSMP or all comparison, as the unit of analysis rather than the class.

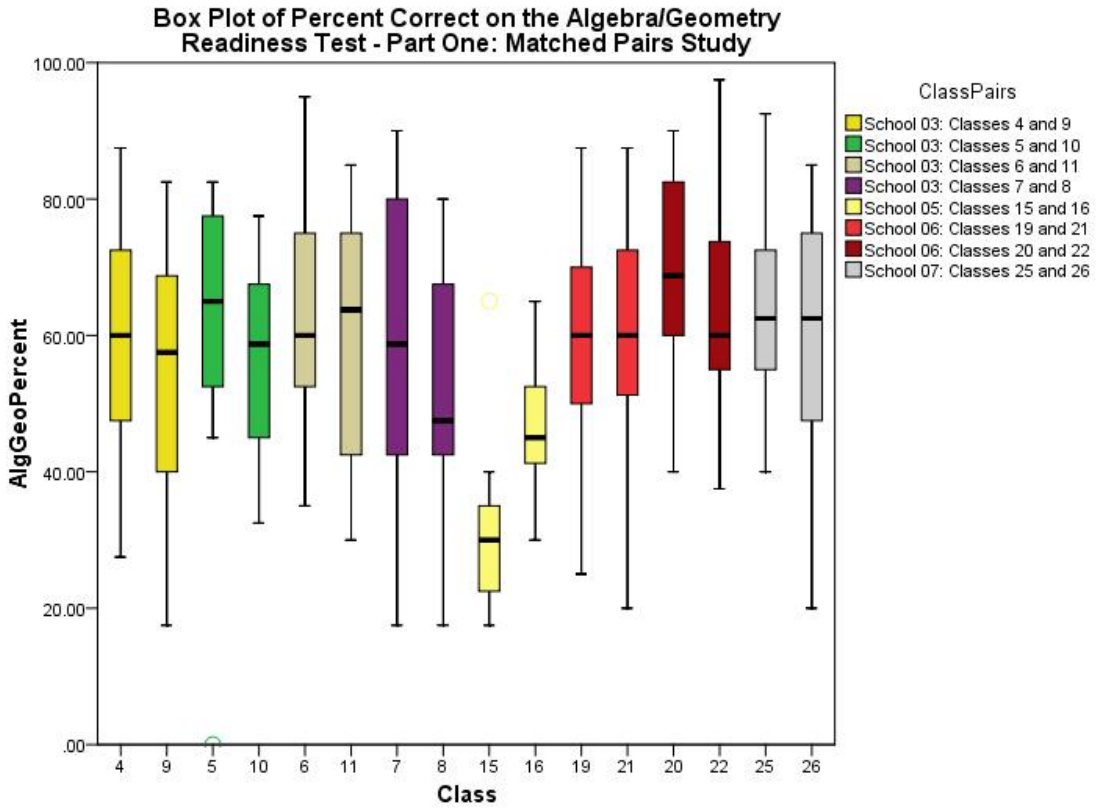


Figure 16. Box Plots of Percent Correct by Class for the *Algebra/Geometry Readiness Test — Part One*: Matched Pairs Study (For each pair, the UCSMP class is represented by the left bar in the pair.)

Among the 40 items on the test, 9 dealt with Skills, 6 with Properties, 10 with Uses, and 15 with Representations. Table 75 reports the percent correct by class for each of these four dimensions of understanding.

Table 75. Mean Percent Correct (Standard Deviation) for the Items Comprising the Four Dimensions of Understanding on the *Algebra/Geometry Readiness Test — Part One* by Class: Matched Pairs Study

School	*Transition Mathematics*						Comparison					
	Class	*n*	Skills	Prop	Uses	Rep.	Class	*n*	Skills	Prop	Uses	Rep
03	004	13	54.7 (25.4)	73.1 (24.1)	53.8 (16.6)	62.6 (23.8)	009	19	53.8 (22.0)	65.8 (23.9)	50.5 (23.4)	55.8 (19.7)
	005	13	62.4 (25.9)	73.1 (24.1)	56.9 (21.0)	61.0 (25.4)	010	14	60.3 (20.3)	63.1 (19.8)	49.3 (18.6)	58.6 (17.8)
	006	14	59.5 (23.3)	75.0 (25.9)	55.7 (21.0)	66.2 (18.2)	011	14	54.0 (20.4)	72.6 (15.5)	53.6 (25.6)	62.9 (21.4)
	007	14	53.2 (24.3)	70.2 (28.6)	55.0 (26.5)	58.1 (27.8)	008	17	55.6 (20.4)	67.6 (19.1)	42.9 (22.6)	52.2 (19.5)
05	015	7	22.2 (24.0)	28.6 (26.7)	24.3 (19.0)	45.7 (15.6)	016	8	36.1 (11.5)	50.0 (15.4)	42.5 (11.6)	54.2 (16.9)
06	019	25	52.9 (25.1)	78.7 (19.0)	49.6 (18.8)	65.9 (16.8)	021	23	57.0 (24.0)	73.9 (18.7)	56.5 (21.0)	61.2 (18.8)
	020	26	61.1 (24.0)	78.2 (16.8)	62.7 (19.9)	73.3 (16.0)	022	19	54.4 (22.2)	78.9 (15.6)	57.4 (19.1)	67.4 (17.6)
07	025	30	63.3 (18.9)	71.7 (19.6)	56.0 (18.1)	68.4 (15.9)	026	26	62.4 (18.3)	64.7 (20.2)	58.1 (25.6)	57.9 (17.9)
Overall Gr. 7[a]		142	56.8 (24.6)	72.4 (23.8)	54.3 (21.1)	65.3 (20.0)		140	55.9 (21.1)	68.5 (19.9)	52.6 (22.3)	59.1 (18.8)

Note: Percents are based on the following groups: *Skills*, 9 items (1, 4, 10, 12, 19, 25, 27, 28, 34); *Properties*, 6 items (2, 9, 15, 16, 23, 37); *Uses*, 10 items (3, 5, 7, 8, 11, 13, 18, 29, 32, 35); and *Representations*, 15 items (6, 14, 17, 20, 21, 22, 24, 26, 30, 31, 33, 36, 38, 39, 40). Dependent measures *t*-tests indicate that the differences in achievement between students studying from the two sets of curricula, based on the mean of the pair differences (UCSMP – comparison), are not significant: for Skills, $\bar{x} = -0.54, s_{\bar{x}} = 6.49, t = -0.234, p = 0.821$, with effect size d = -0.029 (r = 0.940); for Properties, $\bar{x} = 1.50, s_{\bar{x}} = 9.84, t = 0.431, p = 0.679$, with effect size d = 0.078 (r = .869); for Uses, $\bar{x} = 0.40, s_{\bar{x}} = 9.48, t = 0.119, p = 0.908$, with effect size d = 0.038 (r = 0.585); and for Representations, $\bar{x} = 3.88, s_{\bar{x}} = 5.57, t = 1.969, p = 0.090$, with effect size d = 0.484 (r = 0.758).

[a] Overall results are based on using the student, either all UCSMP or all comparison, as the unit of analysis rather than the class.

With the exception of students at School 05, achievement was relatively close for UCSMP and non-UCSMP students on Skills and Uses. Achievement on Properties tended to be in the 60-70% range, with UCSMP students generally scoring slightly higher than their non-UCSMP peers; however, there were a limited number of items dealing with Properties. UCSMP students also scored slightly higher than non-UCSMP students on items dealing with Representations. Overall, there were no significant differences in achievement on the four dimensions of understanding between students studying from the *Transition Mathematics* or the comparison curricula.

Achievement on the Fair Tests from the *Algebra/Geometry Readiness Test: Part One*

Table 76 reports the achievement results for the Fair Tests constructed for each school. Overall, the mean percents correct changed little from the entire test results to the Fair Test results, even though the Fair Tests control for opportunity to learn at the class/school level. The mean percent increased slightly for non-UCSMP students at School 03, likely a reflection of the fact that the OTL percentage had been somewhat low for these students on the entire test and that influence has been accommodated in these results.

Only at School 05 was there any significant difference in the class means. Nevertheless, overall there was no significant difference in achievement for students studying from the *Transition Mathematics* or comparison curricula.

Achievement on the Conservative Test from the *Algebra/Geometry Readiness Test: Part One*

Table 77 reports the achievement results for the Conservative Test constructed of those 16 items for which all teachers in the study, both UCSMP and comparison, indicated they had taught or reviewed the content needed for their students to answer the items. Among these items, there is a balance across the four dimensions of understanding, with 5 focusing on Skills, 4 on Properties, 4 on Uses, and 3 on Representations.

The *Transition Mathematics* and comparison students scored roughly comparably, with the differences between the means of the class pairs less than 3% except for Classes 005 and 011 (7.6%), Classes 020 and 022 (6.6%), and Classes 015 and 016 (-18.7%). However, overall there was no significant difference in achievement between students studying from the UCSMP *Transition Mathematics* or non-UCSMP comparison curricula.

Table 76. Mean Percent Correct on the Fair Tests of the *Algebra/Geometry Readiness Test — Part One* by Class: Matched Pairs Study

School	*Transition Mathematics*				Comparison							
	Class	*n*	Mean Percent	s.d.	Class	*n*	Mean Percent	s.d.	SE	*t*	df	*p*
03	004	13	62.7	18.2	009	19	58.7	20.7	7.09	0.564	30	0.577
	005	13	65.5	23.7	010	14	59.8	17.1	7.91	0..726	25	0.475
	006	14	63.5	20.0	011	14	64.0	18.0	7.18	-0.074	26	0.942
	007	14	58.5	26.0	008	17	54.0	18.2	7.96	0.557	29	0.582
05	015	7	30.0	18.9	016	8	46.9	10.7	7.79	-2.166	13	0.050*
06	019	25	62.4	15.2	021	23	62.7	15.9	4.49	-0.083	46	0.935
	020	26	68.9	14.4	022	19	64.0	14.8	4.39	1.124	43	0.267
07	025	30	64.7	13.8	026	26	60.0	17.4	4.18	1.117	54	0.269

Note: * indicates significant differences between the classes at the pair level. Items comprising each *Fair Test* are as follows: for School 03, 27 items (2-6, 8-13, 15, 17-19, 21,23, 25,28-31, 33, 35, 37, 39, 40); for School 05, 20 items (1-6, 9,10, 12-14, 16, 18, 19, 21, 23, 25, 27, 37, 39); for pair 1 at School 06 (Classes 019 and 021), 37 items (1-6, 8-13, 15-30, 32-40); for pair 2 at School 06 (Classes 020 and 022), 38 items (1-6, 8-30, 32-40); for School 07, all 40 items. A dependent-measures *t*-test indicates that the difference in achievement (UCSMP – comparison) between students studying from the *Transition Mathematics* or the comparison curricula is not significant: $\bar{x} = 0.76, s_{\bar{x}} = 7.52, t = 0.287, p = 0.783$. The effect size between the UCSMP and comparison classes is $d = 0.048$ based on the formula recommended by Dunlap et al. (1996), $d = t_c[2(1 - r)/n]^{1/2}$, with $t_c = 0.287$ ($p = 0.783$), $r = 0.890$, and $n = 8$.

Table 77. Mean Percent Correct on the Conservative Test of the *Algebra/Geometry Readiness Test — Part One* by Class: Matched Pairs Study

School	*Transition Mathematics*				Comparison							
	Class	*n*	Mean Percent	s.d.	Class	*n*	Mean Percent	s.d.	SE	*t*	df	*p*
03	004	13	67.8	18.0	009	19	65.1	24.1	7.88	0.337	30	0.738
	005	13	75.0	26.3	010	14	67.4	19.8	8.91	0.852	25	0.402
	006	14	70.1	22.8	011	14	67.4	20.4	8.17	0.328	26	0.746
	007	14	66.1	29.1	008	17	65.1	18.9	8.67	0.115	29	0.909
05	015	7	31.3	24.2	016	8	50.0	12.5	9.75	-1.924	13	0.077
06	019	25	71.5	16.2	021	23	71.5	16.1	4.67	0.007	46	0.994
	020	26	76.7	15.6	022	19	70.1	19.0	5.16	1.281	43	0.207
07	025	30	74.2	16.1	026	26	73.8	22.0	5.10	0.072	54	0.943
Overall Gr. 7[a]		142	70.3	21.7		140	68.0	20.1				

Note: Items comprising the *Conservative Test* are as follows: 16 items (2-6, 9, 10, 12, 13, 18, 19, 21, 23, 25, 37, 39). A dependent measures *t*-test indicates that the difference in achievement (UCSMP – comparison) between students studying from *Transition Mathematics* or the comparison curricula is not significant: $\bar{x} = 0.29, s_{\bar{x}} = 8.16, t = 0.100, p = 0.923$. The effect size between the UCSMP and comparison classes is $d = 0.011$ based on the formula recommended by Dunlap et al. (1996), $d = t_c[2(1 - r)/n]^{1/2}$, with $t_c = 0.100$ ($p = 0.923$), $r = 0.948$, and $n = 8$.

[a] Overall results are based on using the student, either all UCSMP or all comparison, as the unit of analysis rather than the class.

Achievement on the Growth Items on the *Algebra/Geometry Readiness Test: Part One*

Table 78 (p. 144) reports the mean percent correct at the beginning and end of the year for the 24 items common to the *Middle School Mathematics Test* (i.e., one of the pretests) and the *Algebra/Geometry Readiness Test: Part One* (i.e., one of the posttests). Among these 24 items, 6 focus on Skills, 4 on Properties, 6 on Uses, and 8 on Representations, to address all four dimensions of understanding overtly identified in *Transition Mathematics*.

Overall, achievement was higher at the end of the year than at the beginning for all but the comparison students in Class 026 at School 07, whose end of year achievement was 1.5% lower than at the beginning of the year. In addition, the achievement at the end of the year was more than 10% higher than at the beginning of the year for all students except those in UCSMP Class 015 at School 05, which had a mean increase of less than 5%. (Note: Actual achievement on the individual items is reported in the next section.) Growth over the year was significant for both UCSMP *Transition Mathematics* students as well as their comparison peers. Effect sizes were slightly more than three-fourths of a standard deviation for the UCSMP students and more than 1.25 standard deviations for the comparison students. If the results from School 05 are omitted, the effect size would be 3.66 for the UCSMP students and 1.39 for the comparison students. The growth for the UCSMP students at School 05 (Class 015) was less relative to other UCSMP classes than the growth for the comparison students (Class 016) relative to other comparison students.

A regression was run to predict growth on the common items using as predictor variables the pretest achievement on these common items, the teachers' reported opportunity to learn these items, and the curriculum type (with UCSMP coded 1 and the comparison curricula coded 0). Table 79 reports the regression coefficients. Only achievement on the common items at the time of the pretest was a significant predictor of achievement on these common items at the posttest. Although not quite at the significant level, UCSMP students scored about 3% better than comparison students when initial achievement and opportunity to learn were controlled.

Table 79. Unstandardized Regression Coefficients and Significance for Model Predicting Growth on the Common Items from the *Middle School Mathematics Test* and the *Algebra/Geometry Readiness Test — Part One* Pretest Knowledge, Posttest Opportunity to Learn on Common Items, and Curriculum

Predictor Variable	β	*t*	*p*
Constant	32.673	4.432	< 0.001*
Achievement on Common Items at Pretest	0.733	15.571	< 0.001*
Opportunity to Learn on Common Items	-0.080	-0.911	0.362
Curriculum Type (UCSMP = 1)	3.331	1.812	0.071

Note: $F(3, 278) = 88.513$, $p < 0.000$, $R^2 = 48.9\%$.

Table 78. Mean Percent Correct for Items Common to the *Middle School Mathematics Test* and the *Algebra/Geometry Readiness Test — Part One* by Class: Matched Pairs Study

School	*Transition Mathematics*							Comparison						
			Pretest		Posttest		OTL%			Pretest		Posttest		OTL%
	Class	*n*	mean	s.d.	mean	s.d.		Class	*n*	mean	s.d.	mean	s.d.	
03	004	13	49.4	18.8	64.4	18.4	100	009	19	42.5	21.4	63.2	23.0	75
	005	13	52.6	20.3	68.9	25.4	100	010	14	42.0	20.6	63.1	18.3	75
	006	14	47.0	19.4	66.4	19.0	100	011	14	56.0	17.9	68.2	17.4	75
	007	14	47.6	24.7	62.5	27.6	100	008	17	39.0	12.8	56.9	18.2	75
05	015	7	29.8	12.4	31.0	18.6	63	016	8	35.4	11.6	47.4	11.1	92
06	019	25	51.0	15.2	66.7	17.3	96	021	23	55.8	17.7	66.7	15.9	96
	020	26	56.4	14.5	73.2	14.3	96	022	19	57.2	14.9	68.0	17.0	100
07	025	30	58.9	15.6	69.6	14.3	100	026	26	65.1	13.0	63.6	17.8	100
Overall Gr. 7[a]		142	51.9	18.2	66.3	20.2			140	51.3	19.0	63.3	18.3	

Note: There are 24 posttest items that comprise these results: 1, 3, 4, 6, 8, 9, 10, 11, 12, 13, 16, 17, 18, 21, 23, 24, 25, 26, 30, 31, 32, 33, 34, 37. The growth from pretest to posttest was significant for each individual group: UCSMP *Transition Mathematics* classes, $\bar{x} = 13.75, s_{\bar{x}} = 5.62, t = 6.918, p = 0.0002$, with effect size $d = 0.773$ ($r = 0.950$); and non-UCSMP comparison classes, $\bar{x} = 13.01, s_{\bar{x}} = 7.27, t = 5.062, p = 0.001$, with effect size $d = 1.30$ ($r = 0.737$). Effect sizes were computed based on the formula by Dunlap et al. (1996).

[a] Overall results are based on using the student, either all UCSMP or all comparison, as the unit of analysis rather than the class.

Item-Level Achievement on the *Algebra/Geometry Readiness Test: Part One*

Item scores were examined to provide another means of understanding the achievement results reported earlier in this section. Figure 17 contains the stems of the items on the *Algebra/Geometry Readiness Test: Part One*, grouped by content strand; each complete item, with graphics and option choices, can be found in Appendix D. Table 80 reports the percent of students in each class, along with the overall percentage of the students in each group, who were able to answer each item in Figure 17 successfully. In addition, for those items common to the pretest and posttest, the pretest percents correct are also shown. Likewise, for those test items originally on the National Assessment of Educational Progress (NAEP) or the Third International Mathematics and Science Study (TIMSS)[20], the national or international percent correct on those items is shown. In interpreting these percents, it is important to take into consideration that the NAEP and TIMSS percents are for students at grade 8, and the students participating in the Matched Pairs study of the *Transition Mathematics Evaluation Study* are at grade 7.

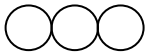
For those 25 items from NAEP or TIMSS, the UCSMP *Transition Mathematics* students had a higher percent correct than the NAEP or TIMSS samples on all but 6 of the items: item 4 (finding the length of the side of a square from the perimeter); item 36 (finding a missing angle measure in a symmetric quadrilateral), item 28 (finding the angle measure in a quadrilateral); item 40 (finding measures in similar triangles); item 38 (identifying cylinders from a set of shapes); and item 35 (writing a decimal as a fraction). The UCSMP students had a percent correct at least 20% higher than the NAEP or TIMSS sample on four of the items (items 11, 26, 2) and between 10% and 20% higher on 6 items (items 18, 12, 1, 6, 20, 19). The comparison students had a higher percent correct than the NAEP or TIMSS sample on all but 10 items: item 4 (finding the length of the side of a square from the perimeter), item 30 (finding the area of a square when a triangle is removed from its interior); item 36 (finding a missing angle in a symmetric quadrilateral); item 15 (identifying statements about the properties of a rectangle); item 28 (finding the angle measure in a quadrilateral); item 40 (finding measures in similar triangles); item 19 (finding the angle measure of an acute angle in a right triangle); item 22 (finding the net for a prism); item 38 (identifying cylinders from a set of shapes); and item 35 (writing a decimal as a fraction). Among the comparison students, there were four items for which the percent correct was at least 20% higher than the NAEP or TIMSS sample (items 1, 6, 26, 2) and between 10% and 20% higher on 5 items (items 18, 12, 20, 7, 29).

On 9 of the 40 items (22.5%), the overall percent correct for both UCSMP and comparison students was at least 80% (items 3, 9, 12, 31, 23, 26, 22, 38, 2). There was only 1 item (#40) for which fewer than 20% of students (in this case comparison students) answered the item correctly. There were no items with at least at 20% difference in percent correct between UCSMP and comparison students.

Both UCSMP and comparison students generally did well on most items within variables and their uses, equations and inequalities, measurement, and transformations and symmetry. Both groups had more difficulty with geometric figures and their properties and with some of the arithmetic items; however, for many of the students, the content assessed on items in these two strands was reported by the teacher as not taught or reviewed.

[20] The Third International Mathematics and Science Study is now called the Trends in International Mathematics and Science Study.

Figure 17. Stems of UCSMP *Algebra/Geometry Readiness Test: Part One* Items by Content Strand and SPUR Category

Posttest (Pretest) Item No.	SPUR	Item Stem
Variables and Their Uses		
3 (35)	U	There were x boxes. Each box had s shoes in it. How many shoes are there in all?
8* (40)	U	Tetsu rides his bicycle x miles the first day, y miles the second day, and z miles the third day. Which of the following expressions represents the average number of miles per day that Tetsu travels?
13 (45)	U	There are x students from a class on school teams. There are y students in the class. How many students are <u>not</u> on school teams?
18* (48)	U	A plumber charges customers \$48 for each hour worked plus an additional \$9 for travel. If h represents the number of hours worked, which of the following expressions could be used to calculate the plumber's total charge in dollars?
9 (41)	P	Which expression describes the pattern in the first four rows of the table?
37 (59)	P	Which expression fits all instances of the pattern below?
Equations and Inequalities		
12* (44)	S	Suppose that $3 \times (\square + 5) = 30$. The number in the box should be _____.
25 (53)	S	Solve: $n - 3 = 2n + 19$.
31* (55)	R	The objects on the scale below make it balance exactly. According to this scale, if  balances  , then  balances which of the following?
1* (37)	S	What is the least whole number x for which $2x > 11$?
16 (46)	P	If m and n are not zero, which of the following is <u>not</u> necessarily true?
23 (49)	P	The dot • stands for multiplication. Suppose you can replace x by any number you wish. Which is <u>not</u> correct?
14	R	Which is the graph of the equation $x + y = 10$?
39**	R	The graph below shows the humidity in a room as recorded on a certain morning. On the morning shown in the graph, how many times between 6 a.m. and 12 noon was the humidity exactly 20 percent?
Measurement		
4* (36)	S	The perimeter of a square is 36 inches. What is the length of one side of the square?
10 (42)	S	A rectangle has length of 3.6 cm and width of 5 cm. Which numerical expression gives the perimeter of the rectangle?
17 (47)	R	Consider the two figures below. All of the angles are right angles. How do the perimeters of the two figures compare?
6* (38)	R	Which numerical expression gives the area of the rectangle at the right?
21 (51)	R	A rectangular pool has dimensions 10 meters by 30 meters. It is surrounded by a walkway as shown by the shading in the diagram at right. Which of the following gives the area of the walkway in square meters?

Posttest (Pretest) Item No.	SPUR	Item Stem
30* (54)	R	If the area of the shaded triangle shown at the right is 4 square inches, what is the area of the entire square?
33 (57)	R	Each square on the grid at the right represents 1 square unit. Find the area of figure *PIGS* in square units.
11* (43)	U	Suppose that a measurement of a rectangular box is given as 48 cubic inches. What could the measurement represent?
32 (56)	U	A small plastic cube has a volume of 64 cubic inches. It is going to be covered with soft fabric to make a baby toy. How much fabric, in square inches, will be needed to cover the cube if the fabric does not overlap?
34 (58)	S	How many cubes 1 cm by 1 cm by 1 cm can be packed in a box measuring 2 cm by 5 cm by 6 cm?
Transformations and Symmetry		
26* (50)	R	Consider the triangle and line shown at the right. Which of the following shows the result of flipping the triangle over the line ℓ?
24 (52)	R	Triangle *TRY* is translated 3 units to the right and 4 units up. What will be the coordinates of the image of point *Y*?
36**	R	The line *m* is a line of symmetry for figure *ABCDE*. The measure of angle *BCD* is …
Geometric Figures and Their Properties		
15**	P	Of the following, which is NOT true for all rectangles?
28**	S	In a quadrilateral, each of two angles has a measure of 115°. If the measure of a third angle is 70°, what is the measure of the remaining angle?
40**	R	The figure represents two similar triangles. The triangles are not drawn to scale. In the actual triangle *ABC*, what is the length of side *BC*?
20**	R	In this figure, triangles *ABC* and *DEF* are congruent with *BC* = *EF*. What is the measure of angle *EGC*?
19*	S	One of the acute angles in a right triangle measures 28 degrees. What is the measure, in degrees, of the other acute angle?
22*	R	Which of the following can be folded to form the prism above?
38*	R	Which of these shapes are cylinders?
Arithmetic		
2**	P	Which of these fractions is smallest?
27**	S	What is the value of $\frac{4}{5}-\frac{1}{3}-\frac{1}{15}$?
35**	U	The total weight of a pile of 500 salt crystals is 6.5 g. What is the average weight of a salt crystal?
5**	U	Sound travels at approximately 330 meters per second. The sound of an explosion took 28 seconds to reach a person. Which of these is the closest estimate of how far away the person was from the explosion?

Posttest (Pretest) Item No.	SPUR	Item Stem
7*	U	If the price of a can of beans is raised from 50 cents to 60 cents, what is the percent increase in the price?
29*	U	Of the following, which is the closest approximation to a 15 percent tip on a restaurant check of $24.99?

Note: * indicates the item is adapted from NAEP; ** indicates the item is adapted from TIMSS.

Table 80. Percent Successful on *Algebra/Geometry Readiness Test — Part One* by Item and Class: Matched Pairs Study

Item	SPUR	School 03 Classes								School 05 Classes	
		UCSMP 004 *n* = 13	Comp 009 *n* = 19	UCSMP 005 *n* = 13	Comp 010 *n* = 14	UCSMP 006 *n* = 14	Comp 011 *n* = 14	UCSMP 007 *n* = 14	Comp 008 *n* = 17	UCSMP 015 *n* = 7	Comp 016 *n* = 8
Variables and Their Uses											
3	U	85 (62)	68 (42)	85 (54)	71 (43)	93 (43)	79 (57)	71 (43)	71 (35)	29 (71)	63 (38)
8	U	77 (54)	79 (53)	69 (77)	57 (50)	64 (43)	79 (50)	79 (57)	71 (41)	14 (43)	38 (25)
13	U	38 (31)	53 (32)	69 (23)	43 (36)	57 (36)	50 (36)	64 (21)	53 (6)	14 (29)	50 (38)
18	U	92 (46)	79 (42)	85 (69)	71 (43)	71 (57)	64 (79)	71 (57)	65 (35)	29 (14)	63 (25)
9	P	92 (85)	84 (42)	92 (77)	86 (64)	86 (43)	100 (64)	86 (86)	100 (53)	43 (43)	88 (38)
37	P	54 (31)	79 (26)	69 (62)	71 (29)	64 (29)	71 (57)	64 (50)	88 (41)	14 (0)	13 (0)
Equations and Inequalities											
12	S	77 (85)	79 (63)	85 (85)	93 (64)	71 (71)	93 (86)	93 (71)	76 (65)	29 (0)	75 (38)
25	S	31 (31)	42 (21)	54 (15)	50 (21)	29 (36)	36 (43)	50 (14)	65 (18)	0 (14)	0 (13)
31	R	77 (77)	79 (68)	85 (77)	79 (79)	86 (93)	93 (86)	57 (71)	76 (76)	43 (71)	88 (88)
1	S	46 (54)	74 (32)	46 (62)	79 (50)	64 (21)	64 (36)	50 (36)	65 (24)	14 (29)	25 (25)
16	P	54 (15)	37 (21)	54 (15)	21 (36)	64 (29)	21 (0)	57 (7)	24 (18)	14 (0)	50 (0)
23	P	92 (85)	89 (84)	85 (85)	86 (50)	79 (71)	93 (93)	79 (79)	76 (71)	29 (29)	38 (50)
14	R	31	21	8	29	57	29	29	35	43	25
39	R	46	58	54	43	64	50	50	82	43	88

Item	SPUR	School 03 Classes								School 05 Classes	
		UCSMP 004 *n* = 13	Comp 009 *n* = 19	UCSMP 005 *n* = 13	Comp 010 *n* = 14	UCSMP 006 *n* = 14	Comp 011 *n* = 14	UCSMP 007 *n* = 14	Comp 008 *n* = 17	UCSMP 015 *n* = 7	Comp 016 *n* = 8
						Measurement					
4	S	54 (77)	58 (58)	54 (69)	50 (29)	57 (64)	57 (57)	50 (71)	65 (35)	57 (71)	38 (50)
10	S	54 (15)	58 (32)	85 (38)	79 (36)	79 (43)	71 (64)	43 (43)	41 (12)	14 (0)	38 (0)
17	R	62 (69)	58 (42)	54 (46)	50 (21)	43 (36)	64 (50)	64 (43)	35 (41)	57 (43)	25 (75)
6	R	69 (46)	79 (37)	85 (69)	86 (43)	64 (57)	71 (64)	64 (50)	71 (35)	57 (14)	63 (38)
21	R	77 (23)	58 (16)	77 (38)	57 (21)	86 (21)	86 (79)	71 (29)	29 (18)	14 (29)	50 (13)
30	R	46 (15)	26 (21)	15 (38)	43 (29)	36 (50)	71 (36)	36 (43)	12 (41)	43 (0)	38 (38)
33	R	69 (62)	68 (68)	77 (77)	71 (50)	71 (64)	79 (64)	50 (43)	47 (71)	29 (43)	63 (38)
11	U	38 (54)	58 (53)	85 (38)	64 (43)	71 (43)	64 (64)	64 (43)	24 (29)	29 (0)	13 (50)
32	U	31 (23)	32 (16)	38 (15)	21 (14)	21 (29)	29 (21)	36 (14)	29 (18)	14 (43)	50 (50)
34	S	62 (23)	32 (32)	46 (15)	50 (21)	64 (14)	57 (29)	50 (43)	47 (47)	14 (43)	63 (0)
						Transformations and Symmetry					
26	R	92 (77)	89 (68)	85 (69)	79 (79)	100 (79)	71 (71)	79 (64)	82 (76)	71 (57)	75 (75)
24	R	77 (46)	58 (53)	77 (46)	57 (57)	71 (57)	71 (57)	71 (64)	53 (29)	71 (29)	38 (50)
36	R	38	21	38	43	64	36	64	24	29	25

Item	SPUR	School 03 Classes								School 05 Classes	
		UCSMP 004 *n* = 13	Comp 009 *n* = 19	UCSMP 005 *n* = 13	Comp 010 *n* = 14	UCSMP 006 *n* = 14	Comp 011 *n* = 14	UCSMP 007 *n* = 14	Comp 008 *n* = 17	UCSMP 015 *n* = 7	Comp 016 *n* = 8
Geometric Figures and Their Properties											
15	P	69	32	54	29	79	64	64	41	29	63
28	S	46	47	54	36	36	14	21	35	0	13
40	R	38	11	31	21	21	21	7	18	29	13
20	R	54	53	77	57	43	43	71	35	29	38
19	S	62	42	69	43	64	36	71	41	43	38
22	R	100	79	92	86	93	71	86	82	71	88
38	R	62	79	62	79	93	86	71	100	57	100
Arithmetic											
2	P	77	74	85	86	79	86	71	76	43	50
27	S	62	53	69	64	71	57	50	65	29	38
35	U	15	37	23	21	50	43	36	18	14	50
5	U	85	42	69	64	79	36	57	41	43	50
7	U	8	11	23	14	14	36	29	18	14	13
29	U	69	47	23	64	36	57	43	41	43	38

Note: * represents Grade 8 NAEP percent correct for the item; ** represents Grade 8 TIMSS international percent correct for the item. Underlined percents indicate items for which teachers reported not teaching or reviewing the content needed for their students to answer the item. Percentages in parentheses represent the percent correct on the item on the pretest.

Table 80. (Continued)

Item	SPUR	School 06 Classes				School 07 Classes		Overall Average[a]		NAEP/ TIMSS Percent Correct
		UCSMP 019 *n* = 25	Comp 021 *n* = 23	UCSMP 020 *n* = 26	Comp 022 *n* = 19	UCSMP 025 *n* = 30	Comp 026 *n* = 26	UCSMP *n* = 142	Comp *n* = 140	
					Variables and Their Uses					
3	U	80 (52)	87 (52)	92 (31)	84 (58)	93 (87)	96 (85)	84 (56)	80 (54)	
8	U	68 (52)	74 (61)	62 (58)	89 (68)	67 (63)	58 (65)	65 (57)	70 (55)	58*
13	U	52 (48)	74 (70)	81 (58)	53 (47)	57 (33)	65 (69)	58 (38)	57 (45)	
18	U	68 (48)	78 (43)	85 (69)	84 (53)	80 (63)	73 (62)	76 (57)	74 (49)	58*
9	P	92 (60)	87 (70)	96 (62)	84 (74)	90 (90)	85 (85)	89 (70)	89 (64)	
37	P	84 (52)	78 (65)	85 (54)	74 (58)	73 (43)	69 (73)	70 (44)	72 (49)	
					Equations and Inequalities					
12	S	96 (88)	87 (87)	96 (92)	95 (84)	97 (87)	92 (85)	87 (80)	87 (75)	69*
25	S	32 (32)	57 (17)	23 (27)	58 (32)	47 (37)	38 (46)	35 (28)	46 (28)	
31	R	80 (76)	83 (83)	92 (81)	89 (100)	100 (90)	85 (88)	83 (81)	84 (84)	75*
1	S	48 (36)	74 (52)	77 (58)	74 (68)	63 (60)	54 (69)	56 (47)	66 (48)	44*
16	P	52 (28)	43 (30)	54 (19)	68 (32)	47 (40)	31 (38)	51 (23)	37 (25)	
23	P	100 (76)	91 (87)	92 (88)	74 (47)	83 (80)	77 (85)	85 (78)	81 (74)	
14	R	28	4	46	37	47	50	37	29	
39	R	64	70	88	58	80	50	67	61	58**

Item	SPUR	School 06 Classes				School 07 Classes		Overall Average[a]		NAEP/ TIMSS Percent Correct
		UCSMP 019 *n* = 25	Comp 021 *n* = 23	UCSMP 020 *n* = 26	Comp 022 *n* = 19	UCSMP 025 *n* = 30	Comp 026 *n* = 26	UCSMP *n* = 142	Comp *n* = 140	
Measurement										
4	S	60 (80)	61 (78)	62 (81)	32 (89)	70 (90)	77 (62)	60 (78)	57 (60)	68*
10	S	52 (28)	43 (43)	50 (38)	63 (26)	73 (53)	77 (69)	59 (37)	60 (39)	
17	R	40 (48)	35 (43)	35 (38)	42 (53)	53 (37)	35 (54)	49 (44)	43 (46)	
6	R	64 (48)	61 (52)	69 (38)	63 (32)	63 (63)	81 (88)	67 (51)	72 (51)	48*
21	R	88 (24)	57 (52)	85 (38)	74 (53)	73 (33)	62 (38)	77 (30)	59 (38)	
30	R	60 (52)	78 (57)	77 (54)	74 (74)	50 (33)	35 (46)	50 (40)	48 (44)	49*
33	R	88 (84)	83 (70)	88 (96)	79 (74)	80 (77)	73 (81)	75 (74)	71 (68)	
11	U	64 (56)	43 (30)	73 (54)	53 (47)	63 (50)	54 (69)	64 (47)	49 (49)	41*
32	U	32 (28)	22 (30)	35 (31)	16 (37)	37 (37)	23 (46)	32 (28)	26 (29)	
34	S	44 (8)	43 (35)	73 (58)	47 (32)	63 (57)	65 (38)	56 (35)	50 (32)	
Transformations and Symmetry										
26	R	84 (52)	83 (78)	88 (73)	89 (79)	77 (60)	73 (69)	85 (65)	81 (74)	59*
24	R	72 (68)	78 (52)	88 (58)	74 (58)	70 (50)	50 (50)	75 (55)	61 (51)	
36	R	60	39	73	58	53	42	56	37	62**

Item	SPUR	School 06 Classes				School 07 Classes		Overall Average[a]		NAEP/ TIMSS Percent Correct
		UCSMP 019 *n* = 25	Comp 021 *n* = 23	UCSMP 020 *n* = 26	Comp 022 *n* = 19	UCSMP 025 *n* = 30	Comp 026 *n* = 26	UCSMP *n* = 142	Comp *n* = 140	
Geometric Figures and Their Properties										
15	P	52	43	50	74	47	35	55	46	54**
28	S	44	30	38	26	43	31	39	31	40**
40	R	20	26	27	21	30	15	25	19	37**
20	R	52	43	50	63	60	54	56	49	38**
19	S	52	49	58	42	50	69	58	47	48*
22	R	92	91	96	95	93	81	92	84	88*
38	R	96	87	96	95	97	85	85	88	93*
Arithmetic										
2	P	92	100	92	100	90	92	84	86	62**
27	S	48	70	73	53	63	58	61	59	52**
35	U	20	35	35	37	27	35	28	34	52**
5	U	68	65	73	84	67	77	69	60	56**
7	U	16	30	35	26	30	46	23	26	16*
29	U	28	57	58	47	40	54	42	51	38*

Note: * represents Grade 8 NAEP percent correct for the item; ** represents Grade 8 TIMSS international percent correct for the item. Underlined percents indicate items for which teachers reported not teaching or reviewing the content needed for their students to answer the item. Percentages in parentheses represent the percent correct on the item on the pretest.

[a] Overall results are based on using the student, either all UCSMP or all comparison, as the unit of analysis rather than the class.

Summary

The *Algebra/Geometry Readiness Test: Part One* was a second measure of students' achievement on content important in *Transition Mathematics* and important for success in subsequent mathematics courses. Except for the comparison teacher at School 03, who essentially created her own curriculum during the year, and the two teachers at School 05, teachers reported teaching or reviewing the content needed to answer more than 90% of the items. Thus, although this test was created by UCSMP personnel, non-UCSMP students had sufficient opportunity to learn the content needed to answer the items.

Even though the test did not count for students' grades, students generally did well on the test, with students generally doing as well as or better than eighth-grade students on those items originally administered as part of the NAEP or TIMSS assessments. In addition, students made considerable growth over the year on the 24 items that were repeated from the pretest.

Achievement on the *Algebra/Geometry Readiness Test: Part One* was examined using four predictor variables: the *TerraNova* CAT survey (a standardized pretest); the *Middle School Mathematics Test* (a UCSMP constructed pretest); the *Algebra/Geometry Readiness Test — Part One* Posttest Opportunity-to-Learn; and curriculum type. The dependent variable of *Algebra/Geometry Readiness Test — Part One* achievement and the first three predictor variables are reported as a percent; curriculum type is a dummy variable with the UCSMP curriculum coded as 1 and the comparison curriculum coded as 0. Table 81 reports the coefficients of the predictor variables and their significance.

For the *Algebra/Geometry Readiness Test — Part One*, the two pretests were significant predictors of achievement as was curriculum type. When prerequisite knowledge and opportunity to learn are controlled, UCSMP students score about 4% higher than comparison students. Together the model accounts for 59% of the variance in the data.

Table 81. Unstandardized Regression Coefficients and Significance for Model Predicting Achievement on the *Algebra/Geometry Readiness Test — Part One* from Pretest Knowledge, Posttest Opportunity to Learn, and Curriculum

Predictor Variable	β	*t*	*p*
Constant	16.159	3.217	< 0.001*
TerraNova CAT Survey (Pretest)	0.352	6.300	< 0.001*
Middle School Mathematics Test (Pretest)	0.493	8.237	< 0.001*
Algebra/Geometry Readiness Test — Part One Opportunity to Learn	-0.108	-1.732	0.084
Curriculum Type (UCSMP = 1)	4.015	2.743	0.006*

Note: Assumptions of normality were checked, with skewness and kurtosis within acceptable ranges. $F(4, 281) = 100.021$, $p < 0.000$, $R^2 = 59.1\%$.

Achievement on the *Algebra/Geometry Readiness Test: Part Two*

The *Algebra/Geometry Readiness Test: Part Two* (see Appendix D) is a constructed-response test developed by UCSMP personnel and graded using the rubrics found in Appendix E. Seven of the items were items released from TIMSS; two of the items were modified from items released from the NAEP assessment.

Overall Achievement on the *Algebra/Geometry Readiness Test: Part Two*

Table 82 reports the mean scores on the entire test, together with teachers' reported opportunity-to-learn. The mean ranged from 5.4 in UCSMP Class 015, School 05 to 14.6 in comparison Class 026, School 07. Only for the pair at School 05, with the lowest achievement of all classes, was the difference between the class means significant. However, overall, there was no significant difference in achievement among students studying from the *Transition Mathematics* or comparison curricula.

Figure 18 uses a boxplot to highlight the variability in the mean scores within each class. The results in the figure again illustrate the extent to which the results at School 05 are lower than those at the other schools, although the results for the comparison class (Class 016) are not as low as those for the UCSMP class (Class 015). Also, at School 06 the results for Pair 1 (Classes 019 and 021) are several points lower than the results for the classes in Pair 2 (Classes 020 and 022). Also, the results for the UCSMP students in Class 005 and the comparison students in Class 011, both at School 03, were several points higher than the results for their peers in the other classes at this school. The minimum score was 0 in comparison Class 010, School 03 and the maximum was 22 in UCSMP Class 005, School 03 and comparison Class 022, School 06.

Table 82. Mean Score and Teachers' Reported Opportunity-to-Learn on the *Algebra/Geometry Readiness Test — Part Two* by Class: Matched Pairs Study

School	*Transition Mathematics*					Comparison								
	Class	*n*	Mean	s.d.	OTL %	Class	*n*	Mean	s.d.	OTL %	SE	*t*	df	*p*
03	004	13	10.2	3.9	85	009	19	10.6	4.3	54	1.497	-0.268	30	0.791
	005	13	12.5	5.0	85	010	14	9.6	4.2	54	1.767	1.638	25	0.114
	006	14	9.9	5.6	85	011	14	12.1	4.9	54	1.983	-1.153	26	0.259
	007	14	9.4	6.0	85	008	17	9.9	4.4	54	1.870	-0.274	29	0.786
05	015	7	5.4	2.6	62	016	8	8.5	2.6	69	1.360	-2.259	13	0.042*
06	019	25	10.2	3.3	100	021	23	11.1	4.3	100	1.105	-0.806	46	0.425
	020	26	14.0	3.9	100	022	19	14.6	4.4	100	1.253	-0.473	43	0.638
07	025	30	12.1	4.8	100	026	26	13.2	3.0	100	1.098	-0.990	54	0.327
Overall Gr. 7[a]		142	11.2	4.9			140	11.6	4.4					

Note: Maximum score is 22. * indicates significant difference between the classes at the pair level. A dependent measures *t*-test indicates that the difference in achievement (UCSMP – comparison) between students studying from the two sets of curricula, based on the mean of the pair differences, is not significant: $\bar{x} = -0.74, s_{\bar{x}} = 1.74, t = -1.196$, $p = 0.271$. The effect size between the UCSMP and comparison classes is d = -0.306 based on the formula recommended by Dunlap et al. (1996), $d = t_c[2(1 - r)/n]^{1/2}$, with t_c = -1.196 (p = 0.271), r = 0.738, and n = 8.

[a] Overall results are based on using the student, either all UCSMP or all comparison, as the unit of analysis rather than the class.

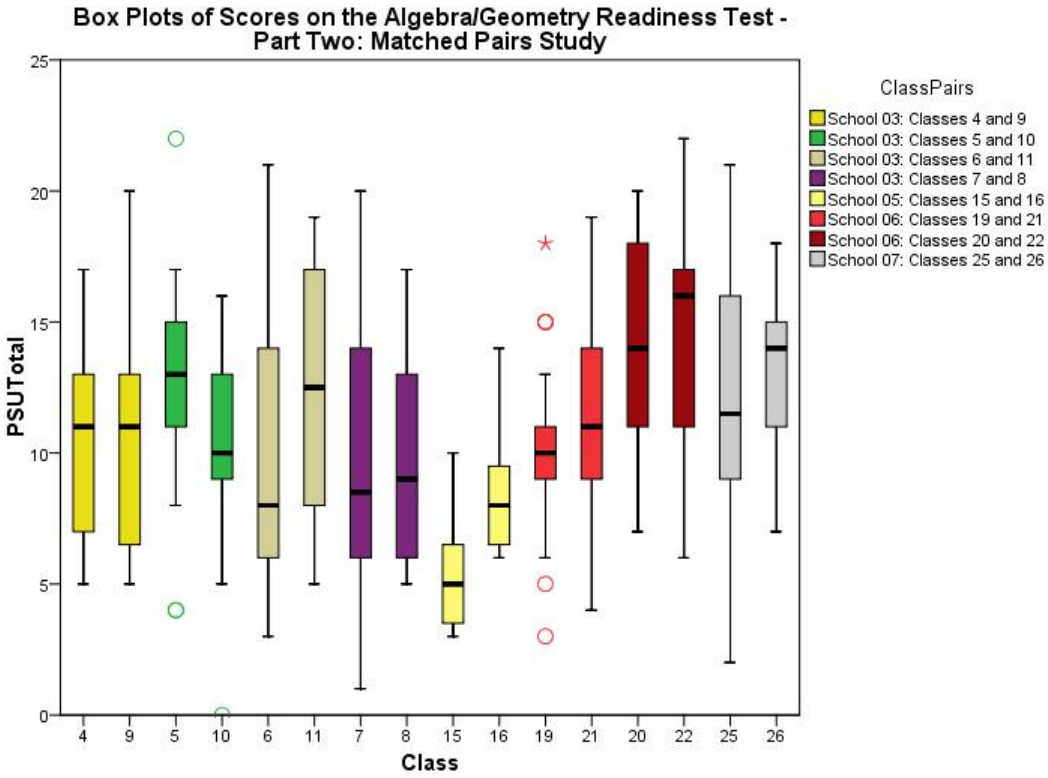


Figure 18. Box Plots of Scores on the *Algebra/Geometry Readiness Test — Part Two* by Class: Matched Pairs Study (maximum score = 22) (In each pair, the UCSMP class is represented by the left bar in the pair.)

Item-Level Achievement on the *Algebra/Geometry Readiness Test: Part Two*

Among the items on the *Algebra/Geometry Readiness Test: Part Two*, there are several that are either released items from TIMSS or adapted from NAEP. Table 83 reports the percent correct by class for those items scored as either right or wrong (i.e., worth 1 point) as well as the percent of students who were successful (score of 2) or partially successful (score of 1) on items on which students could receive some credit for progress toward the problem. Where the national or international percents correct for NAEP or TIMSS, respectively, are available, those percents are also reported. Again, the reader should be reminded that the students in the NAEP and TIMSS studies were in Grade 8 while the students in the Matched Pairs study of *Transition Mathematics* were in Grade 7.

With one exception (item 10 for the comparison students), the overall means for the *Transition Mathematics* and comparison students were higher than the means in the NAEP or TIMSS sample. In one case (item 7b), the mean for the UCSMP students was at least 20% higher than the NAEP sample; in six cases (items 12a, 12b, 10, 6, 7b, 1, 8a), the mean for the comparison students was at least 20% higher than the NAEP or TIMSS samples.

There were two items on which the UCSMP students scored at least 80% correct: item 7a, plotting and labeling a vertex to create a rectangle; item 7b, identifying the coordinates of the point. There were three items for which the comparison students scored at least 80% correct: items 7a and 7b; and item 12a, completing the next two terms in a pattern. On two items the UCSMP students scored less than 20% correct: item 5, solving and graphing the solution of an inequality; and item 8b, writing a fraction for a partial solution of a real-world problem. On solving and graphing the solution of an inequality, the comparison students also scored less than 20% correct.

Table 83. Percent Correct (or Partially Correct) on the *Algebra/Geometry Readiness Test — Part Two* Items by Class: Matched Pair Study

Item	Max Score[a]	School 03 Classes								School 05 Classes	
		UCSMP 004 *n* = 13	Comp 009 *n* = 19	UCSMP 005 *n* = 13	Comp 010 *n* = 14	UCSMP 006 *n* = 14	Comp 011 *n* = 14	UCSMP 007 *n* = 14	Comp 008 *n* = 17	UCSMP 015 *n* = 7	Comp 016 *n* = 8
Variables and Their Uses											
12a**	1	85	89	77	71	57	93	57	82	100	100
12b**	1	69	89	62	64	50	79	43	82	86	75
12c**	S (2)	31	47	69	50	50	43	14	29	29	50
	P (1)	0	11	0	0	0	0	14	0	14	0
Equations and Inequalities											
4**	1	38	37	69	36	43	36	43	35	14	13
10**	S (2)	31	21	39	14	21	43	29	29	14	25
	P (1)	0	0	15	7	7	7	7	0	14	0
5	S (2)	15	0	15	0	14	0	21	0	0	0
	P (1)	8	0	15	0	7	0	0	0	0	0
11a	1	77	53	77	79	86	79	86	71	43	63
11b	S (2)	23	32	23	7	36	43	14	41	14	13
	P (1)	31	21	46	21	21	14	29	12	0	12
Measurement											
6**	1	62	79	77	57	50	64	57	59	14	63
Geometric Figures and Their Properties											
7a*	1	92	79	85	93	79	100	71	94	86	75
7b*	1	77	68	85	79	86	86	64	82	29	88
Arithmetic											
3**	1	38	21	31	36	29	36	21	24	0	0
1**	1	54	74	62	71	50	79	86	71	0	75
2	1	85	58	77	64	57	64	50	53	14	38
8a**	1	15	37	31	29	29	57	21	35	14	38
8b**	1	0	32	8	14	0	29	14	18	0	0

Item	Max Score[a]	School 03 Classes								School 05 Classes	
		UCSMP 004 *n* = 13	Comp 009 *n* = 19	UCSMP 005 *n* = 13	Comp 010 *n* = 14	UCSMP 006 *n* = 14	Comp 011 *n* = 14	UCSMP 007 *n* = 14	Comp 008 *n* = 17	UCSMP 015 *n* = 7	Comp 016 *n* = 8
9*	S (2)	31	47	69	43	43	57	57	23	0	13
	P (1)	31	21	8	14	7	21	7	29	0	12

Note: * represents Grade 8 NAEP percent correct for the item; ** represents Grade 8 TIMSS international percent correct for the item. Underlined percents indicate items for which teachers reported that they did not teach or review the content needed for their students to answer the item.

[a] *S* indicates the student was successful on the item and received the full number of points; *P* indicates the student was partially successful.

[b] These items on the *Algebra/Geometry Readiness Test: Part Two* were adapted from NAEP, but were presented in multiple-choice format on NAEP; the NAEP percents are for the multiple-choice items.

Table 83 (Continued)

Item	Max Score[a]	School 06 Classes				School 07 Classes		Overall Average[c]		NAEP/ TIMSS Percent Correct
		UCSMP 019 *n* = 25	Comp 021 *n* = 23	UCSMP 020 *n* = 26	Comp 022 *n* = 19	UCSMP 025 *n* = 30	Comp 026 *n* = 26	UCSMP *n* = 142	Comp *n* = 140	
Variables and Their Uses										
12a**	1	68	87	88	89	73	92	75	88	65**
12b**	1	60	74	96	84	70	81	68	79	54**
12c**	S (2)	44	39	69	47	27	46	43	44	30**
	P (1)	0	4	0	5	10	4	4	4	
Equations and Inequalities										
4**	1	36	65	54	79	53	92	46	56	44**
10**	S (2)	48	30	46	42	37	39	37	31	33**
	P (1)	0	9	8	16	10	8	7	6	
5	S (2)	0	0	4	68	27	42	13	17	
	P (1)	0	8	4	21	10	15	6	7	
11a	1	68	70	81	84	77	85	76	74	
11b	S (2)	28	9	54	21	7	4	26	20	
	P (1)	16	35	11	26	50	65	27	30	
Measurement										
6**	1	48	43	85	79	53	73	59	65	43**
Geometric Figures and Their Properties										
7a*	1	96	91	100	100	93	92	90	91	
7b*	1	80	87	92	89	93	77	82	81	60[b*]
Arithmetic										
3**	1	56	52	38	47	43	31	37	34	30**
1**	1	48	83	81	79	87	85	65	78	36**
2	1	68	78	81	89	90	69	72	67	
8a**	1	52	57	65	68	40	42	39	46	26**
8b**	1	12	35	38	42	23	12	16	24	12**

Item	Max Score[a]	School 06 Classes				School 07 Classes		Overall Average[c]		NAEP/ TIMSS Percent Correct
		UCSMP 019 *n* = 25	Comp 021 *n* = 23	UCSMP 020 *n* = 26	Comp 022 *n* = 19	UCSMP 025 *n* = 30	Comp 026 *n* = 26	UCSMP *n* = 142	Comp *n* = 140	
9*	S (2)	32	35	65	47	60	54	49	42	40[b*]
	P (1)	12	9	4	11	17	23	11	18	

Note: * represents Grade 8 NAEP percent correct for the item; ** represents Grade 8 TIMSS international percent correct for the item. Underlined percents indicate items for which teachers reported that they did not teach or review the content needed for their students to answer the item.

[a] *S* indicates the student was successful on the item and received the full number of points; *P* indicates the student was partially successful.

[b] These items on the *Algebra/Geometry Readiness Test: Part Two* were adapted from NAEP, but were presented in multiple-choice format on NAEP; the NAEP percents are for the multiple-choice items.

[c] Overall results are based on using the student, either all UCSMP or all comparison, as the unit of analysis rather than the class.

Summary

The *Algebra/Geometry Readiness Test: Part Two* assessed students' achievement on the content of *Transition Mathematics* in a non-multiple choice format. Although there was no significant difference in achievement between students studying from the UCSMP *Transition Mathematics* or comparison curricula, students achieved at least as well, if not considerably better, than eighth-grade students on TIMMS or NAEP items.

Achievement on the *Algebra/Geometry Readiness Test: Part Two* was examined using four predictor variables: the *TerraNova* CAT survey (a standardized pretest); the *Middle School Mathematics Test* (a UCSMP constructed pretest); the *Algebra/Geometry Readiness Test — Part Two* Posttest Opportunity-to-Learn; and curriculum type. The dependent variable of *Algebra/Geometry Readiness Test: Part Two* achievement and the first three predictor variables are reported as a percent; curriculum type is a dummy variable with the UCSMP curriculum coded as 1 and the comparison curriculum coded as 0. Table 84 reports the coefficients of the predictor variables and their significance.

For the *Algebra/Geometry Readiness Test: Part Two*, the two pretests were significant predictors of achievement. When prerequisite knowledge and opportunity to learn are controlled, UCSMP students score about 0.5% lower than comparison students. Together the model accounts for 53% of the variance in the data.

Table 84. Unstandardized Regression Coefficients and Significance for Model Predicting Achievement on the *Algebra/Geometry Readiness Test — Part Two* from Pretest Knowledge, Posttest Opportunity to Learn, and Curriculum

Predictor Variable	β	*t*	*p*
Constant	-0.502	-0.514	0.608
TerraNova CAT Survey (Pretest)	0.099	6.270	< 0.001*
Middle School Mathematics Test (Pretest)	0.109	6.455	< 0.001*
Algebra/Geometry Readiness Test — Part Two Opportunity to Learn	-0.009	-0.718	0.473
Curriculum Type (UCSMP = 1)	-0.419	-0.999	0.319

Note: Assumptions of normality were checked, with skewness and kurtosis within acceptable ranges. $F(4, 281) = 77.935$, $p < 0.000$, $R^2 = 53.0\%$.

Summary

This chapter has described the achievement of students using the Field-Trial Version of the Third Edition of *Transition Mathematics* or the non-UCSMP comparison curricula already in place at the school. Three instruments were used to assess achievement: the *Iowa Algebra Aptitude Test* (a standardized measure); a UCSMP constructed multiple-choice *Algebra/Geometry Readiness Test: Part One*; and a UCSMP constructed free-response *Algebra/Geometry Readiness Test: Part Two*. On all three measures, there were no significant differences between the seventh-grade students using UCSMP *Transition Mathematics* and their

non-UCSMP peers, regardless of whether results were compared on the entire test, the Fair Tests which control for opportunity to learn at the pair or school level, or the Conservative Test which controls for opportunity to learn across the entire group.

On items that were common to both the pretest and the posttest, students in both UCSMP and comparison classes made significant growth. Also, on items that were originally used on assessments from the National Assessment of Educational Progress or the Trends in International Mathematics and Science Study, students in the evaluation study generally performed at least as well, and often much better, than eighth graders who took those same items.

The results at School 05 were disappointing. Students at this school, all of whom were minority, started the year with achievement at the lowest level of all students. Growth for these students was not as large as for the other students at the same grade level, despite the fact that the class size was quite small. The *Transition Mathematics* text was a major change for students at the middle grades, with the study year an attempt to move *Transition Mathematics* from the high school level to the middle school and raise expectations. Although students made some gains, the majority of the students at this school do not appear ready to move to algebra in Grade 8. At this site, students using the comparison curriculum generally scored better than their UCSMP peers.

As indicated in Chapter 2, students at Schools 06 and 07 who participated in the study were generally in a prealgebra course; thus, they were among some of the better students in the school. In contrast, at School 03, classes were heterogeneous and no tracking occurred. Results for students at these three schools were generally comparable, typically with the class means within 10% on the Conservative Tests of the *Iowa Algebra Aptitude Test* and the *Algebra/Geometry Readiness Test: Part One*. Thus, the results suggest that a curriculum balanced across skills, properties, uses, and representations and with a range of content from arithmetic, geometry, and algebra can help all students be successful, and potentially make algebra accessible to a wider range of students than just the top tier.

Chapter 7

Summary and Conclusions

This report has described an evaluation of the Field Trial of *Transition Mathematics* (Third Edition), the second textbook in the curriculum developed by the Secondary Component of the University of Chicago School Mathematics Project. The study contained both formative features to inform the developers as they revised the materials for publication and summative features to assess the effectiveness of the materials. The materials were field tested with advanced sixth grade students, for whom no comparison classes existed, and seventh-grade students in matched pairs of classes in which one class in the pair used *Transition Mathematics* (Third Edition, Field-Trial Version) and the other class used the non-UCSMP curriculum already in place at the school.

From its inception beginning in 1983, *Transition Mathematics* was designed to provide opportunities for students to apply the arithmetic they know, use appropriate technology to explore and do mathematics, build a solid understanding of concepts foundational to a formal course in algebra, learn important geometry concepts, read mathematics, and solve problems with varied wordings. These principles continued with the development of the Third Edition, along with more opportunities for students to engage in active learning and with more opportunities for students to write about mathematics.

As planning for the Third Edition began, the developers realized that many elementary students were entering middle grades with more mathematical knowledge than was true when earlier editions were developed, likely a result of enhancements in the elementary curriculum as a result of the *Standards* movement. Hence, the development team also decided to increase the rigor of *Transition Mathematics*, by moving some content from *Transition Mathematics* to the new sixth-grade course (*Pre-Transition Mathematics*) and by moving some content from *Algebra* to *Transition Mathematics*. With the increased availability of technology, graphing technology, spreadsheets, and interactive geometry systems were also incorporated into the text.

Five main research questions were the focus of this evaluation study:

1. How do teachers use and implement their respective curriculum materials?
2. What support, if any, do teachers need when using the UCSMP *Transition Mathematics* curriculum materials?
3. How does the achievement of students in classes using UCSMP *Transition Mathematics* (Third Edition, Field-Trial Version) compare to that of students using the comparison curriculum already in place at the school, when applicable?
4. How does students' achievement and understanding of key content topics change over the course of the school year?
5. How do students use technology relevant to their curriculum?

The entire study, conducted during the 2005-2006 school year, included:

- A case study of five sixth-grade classes in two schools for which no comparison classes existed (n = 95);
- A matched pairs study of sixteen classes in four schools, with one class in each pair using UCSMP *Transition Mathematics* (n = 142) and the other class using the non-UCSMP curriculum already in place at the school (n = 140). The eight pairs of classes

were matched on the basis of two pretests: the *TerraNova CAT Survey: Form 17* (a standardized measure); and a UCSMP constructed *Middle School Mathematics Test.*

Students completed three instruments at the end of the year to assess achievement on important concepts: the *Iowa Algebra Aptitude Test* (a standardized multiple-choice assessment); a UCSMP constructed multiple-choice *Algebra/Geometry Readiness Test: Part One*; and a UCSMP constructed free-response *Algebra/Geometry Readiness Test: Part Two*. In addition, students completed a survey, the *Middle School Mathematics: Student Information Form*, to gain insight into their perceived frequency and use of reading and writing strategies as well as the use of calculator technology.

In keeping with recommendations from the National Research Council (2004), considerable information was collected from teachers about implementation of the curriculum. In addition to completing a Chapter Evaluation Form (UCSMP teachers) or Chapter Coverage Form (non-UCSMP teachers) for each chapter they taught, teachers completed beginning and end of the year questionnaires about the importance and frequency of various instructional strategies, an opportunity-to-learn form for each posttest, and an interview to determine goals for students and various instructional issues with the curriculum (e.g., reading, writing, technology). Classes, both UCSMP and non-UCSMP, were observed for two to three days at least once during the school year.

This final chapter of the report summarizes the results, draws comparisons between the groups when appropriate, and discusses some of the issues that arise when conducting such a study. It also describes the major changes made from the Field-Trial Version to the final commercial version of *Transition Mathematics* (Third Edition).

The Implemented Curriculum

Opportunities to Learn Mathematics

UCSMP and comparison teachers generally had similar goals for student learning over the course of the year, namely to learn to make sense of mathematics, develop proficiency with integer and rational number operations, and learn the basics of algebra and geometry. The sixth-grade UCSMP teachers, three of the seventh-grade UCSMP teachers, and three of the seventh-grade comparison teachers also considered it important to help students learn to perform computations with speed and accuracy. Teachers were highly influenced by their state standards and grade-level expectations, an issue that was not as evident in previous evaluation studies of *Transition Mathematics*. These state standards or grade-level expectations generally formed the basis for the state assessments used for accountability purposes. Depending on various school or district policies, teachers often left their respective textbook for a few days to a few weeks to review for this state test. However, two of the UCSMP seventh-grade teachers commented that the *Transition Mathematics* text sufficiently covered the expectations for their state assessment.

All but one of the UCSMP *Transition Mathematics* teachers completed through Chapter 8 of the text; that one teacher covered through the middle of Chapter 7. Most teachers taught each lesson of each chapter, completing as many chapters as possible before the school year ended, though one seventh-grade teacher regularly skipped a lesson or two per chapter and consequently was able to teach some lessons from all but one chapter of the text. As might be expected, the sixth-grade teachers covered more of the text than the seventh-grade teachers, generally covering most of the first 10 chapters. One sixth-grade teacher taught some lessons from all 12 chapters.

Overall, the *Transition Mathematics* teachers taught the lessons dealing with number representations, models for the four operations, basic geometry, and basic equation-solving. Only the sixth-grade teachers and one of the seventh-grade teachers taught lessons with linear equations and inequalities and their graphs.

Although *Transition Mathematics* teachers generally assigned the *Covering the Ideas* and *Applying the Mathematics* questions in the lessons they taught, the teachers were much less likely to assign the *Review* questions. Three of the five seventh-grade teachers and one of the sixth-grade teachers assigned less than half of the *Review* questions. Given that UCSMP uses a modified mastery approach and the *Review* questions are a major means for students to continue developing their understanding of the skills and concepts, the limited assignment of the *Review* questions potentially limits students' opportunities to develop mathematical proficiency. At the sixth-grade level, the assignment of fewer *Review* problems did not appear to negatively influence achievement, perhaps because students also covered the majority of the textbook. However, at the seventh-grade level it is more difficult to sort out the interactions of lesson coverage and questions assigned. For instance, at School 06, both UCSMP classes were relatively comparable (i.e., with class means within a point or two at the beginning of the school year). Nevertheless, students in Class 020 covered slightly less of the textbook than students in Class 019 (56% vs. 70%) but completed more of the *Review* problems (82% vs. 48%) and had somewhat higher posttest scores. It is not clear how much achievement differences at this one school might be due to different teachers, the difference in lesson coverage, the difference in percentage of questions assigned, or some interactions of these. This is an area for further study.

The non-UCSMP (that is, the comparison class) teachers taught between 40-55% of their respective text. Reviewing the content of the chapters taught, these teachers generally addressed integer operations, basics of algebra, operations with rational numbers, basic geometry concepts, and statistical graphs. Comparison teachers regularly assigned questions from the text or worksheets related to the text lessons.

Teachers' responses on the Opportunity-to-Learn forms indicate that most teachers, UCSMP and comparison, taught more than 85% of the content on the various posttests. Exceptions were the comparison teacher at School 03 (T2303C1) and the UCSMP teacher at School 05 (T2105U1). Geometry and/or measurement concepts accounted for at least two-thirds of the items for which teachers at these schools reported not teaching or reviewing the necessary content.

Instructional Practices

Teachers generally had 50 to 55 minutes of mathematics instruction per day, with two exceptions. One of the sixth-grade teachers met her students for 90 minutes each day, permitting time for activities and group work. The students at School 05, who started the year at the lowest level of achievement, met for 43 minutes per day and their achievement at the end of the year was also considerably lower than that of other students. Although they needed opportunities to close the gap, they had the least amount of mathematics instructional time in which to do so. In contrast, the sixth-grade students who were already advanced tended to have the most time in which to learn mathematics, likely increasing the achievement gap.

UCSMP and comparison teachers had similar responses to questions about the importance of various instructional activities (e.g., helping students learn to solve problems, helping students learn mathematics concepts). However, UCSMP teachers were slightly less likely than comparison teachers to expect students to use alternative solution methods or to use multiple

representations. Although UCSMP teachers were slightly more likely than comparison teachers to engage students in whole class discussions, comparison teachers were slightly more likely to engage students in small group work. UCSMP teachers also reported spending about 50% more time each lesson reviewing homework than the comparison teachers.

The *Transition Mathematics* (Third Edition, Field-Trial Version) textbook typically includes at least one activity per chapter. Although all teachers recognized the importance of the activities, teachers' use of them was uneven. The sixth-grade teachers and three of the five seventh-grade teachers completed at least 80% of the activities in the chapters they taught. Of the other two seventh-grade teachers, one taught slightly less than half of the activities but the other used only about 13% of the activities available in the chapters taught.

UCSMP and comparison teachers placed comparable emphases on both reading and writing, with a slightly higher emphasis on reading than on writing. UCSMP students were more likely than comparison students (89% to 42% for seventh-grade students) to report their teacher expected them to read their textbook regularly (either daily or 2-3 times per week). However, only about 55% of UCSMP and 36% of comparison students reported actually reading their text with this frequency. Sixth-grade students were likely to report the teacher or students reading aloud in class daily or frequently as well as discussing the reading in class; seventh-grade students reported the teacher reading aloud, students reading silently, and students discussing the reading in class on a regular basis.

Sixth-grade teachers typically expected students to complete 16-30 minutes of homework daily, and students reported spending this amount of time. Seventh-grade teachers generally expected students to spend 31-45 minutes of homework daily, but many students reported spending only 16-30 minutes per day.

The UCSMP teachers generally thought the text provided an appropriate level of challenge to students. All but one of the UCSMP *Transition Mathematics* teachers would use the text again, if provided the opportunity.

Use of Technology

Both UCSMP and comparison students reported using calculators either daily or 2-3 times per week, but computer use was limited in all classes. Both groups of students also reported calculators helpful in learning mathematics. Calculators tended to be used primarily for checking answers, doing computations, and solving problems. Even though graphing calculators were provided on loan to UCSMP classes in sufficient numbers to be loaned to students, most of the middle grades teachers were reluctant to loan them to students for use at home because of the expense and financial responsibility.

Need for Professional Development

In general, UCSMP teachers generally reported needing professional development relevant to technology, specifically graphing calculator technology and how to integrate that technology with the concepts in the book. The UCSMP teachers also reported needing support on using spreadsheets and a dynamic geometry drawing tool.

The Achieved Curriculum

Student achievement at the end of the year was measured with three assessments whose results are summarized here. On the two multiple-choice assessments, achievement was analyzed

in three ways: for the entire test, with an indication of teachers' reported opportunity-to-learn percent; a Fair Test, controlling for opportunity to learn at the teacher or school level; and the Conservative Test, controlling for opportunity to learn at the group or study level (e.g., case study or matched pairs study).

Iowa Algebra Aptitude Test

The *Iowa Algebra Aptitude Test* provides a measure of students' readiness for a course in algebra. Overall, there were no significant differences in achievement among seventh-grade students studying from the UCSMP or non-UCSMP curriculum, regardless of how the results were analyzed. In general, sixth-grade students answered about 80% of the items correctly, corresponding to national percentiles in the high 80s to mid-90s. In contrast, seventh-grade students, regardless of curriculum, generally answered about 60-70% of the items correctly, corresponding to national percentiles between the mid-50s to mid-70s.

Teachers reported teaching or reviewing all of the content needed to answer items for the two parts of the test dealing with identifying expressions to describe verbal problems and identifying rules to describe patterns in a table. Achievement was generally highest on these two parts of the test (parts B and C).

At Schools 03 and 05, the classes consisted of all students at that grade except those needing additional learning support; at the other schools, classes consisted of students who were advanced at the sixth-grade level or in the equivalent of prealgebra at the seventh-grade level. The overall results on this standardized measure suggest that most students who participated in the *Transition Mathematics* Evaluation Study, regardless of curriculum studied, should be ready for an algebra course in eighth grade, with the exception of the students at School 05.

Algebra/Geometry Readiness Test: Part One

Both UCSMP and comparison teachers' opportunity-to-learn responses indicated that the items on this test generally dealt with mathematics that students had studied or reviewed. Overall, there were not significant differences in achievement among seventh-grade students studying from the UCSMP or non-UCSMP curriculum, regardless of how the results were analyzed. Sixth-grade students typically answered 70-80% of the items correctly, while seventh-grade students generally answered 50-70% of the items correctly.

Twenty-four items were common to the *Middle School Mathematics Test* (a pretest) and the *Algebra/Geometry Readiness Test: Part One* (a posttest) to provide a measure of growth over the course of the year. All three main groups (e.g., sixth-grade students, seventh-grade UCSMP students, seventh-grade non-UCSMP students) had significant growth over the course of the year. Sixth-grade students typically had about a 20% growth over the year, while seventh-grade students had a 15% increase.

Twenty-five of the items on the *Algebra/Geometry Readiness Test: Part One* were developed from released eighth-grade items used on the National Assessment of Educational Progress (NAEP) or the Third International Mathematics and Science Study (TIMSS), now called the Trends in International Mathematics and Science Study. Students participating in the evaluation study generally did as well as or better than the eighth-grade students who constituted the NAEP or TIMSS samples. In particular, the sixth-grade students had a higher percent correct on all but two of these 25 items, the seventh-grade UCSMP students on all but 6 of the 25 items, and the seventh-grade non-UCSMP (i.e., comparison) students on all but 10 of the 25 items.

Sixth-grade students had relatively high achievement on all content strands assessed on the test. In contrast, seventh-grade students did well on variables and their uses, equations and inequalities, measurement, and transformations and symmetry but had more difficulty on the strand dealing with geometric figures and their properties.

Algebra/Geometry Readiness Test: Part Two

The *Algebra/Geometry Readiness Test: Part Two* is a free-response test developed by UCSMP personnel and scored using rubrics. Overall, there was no significant difference in achievement between students studying from the UCSMP or non-UCSMP curriculum. Sixth-grade students typically earned between 60-79% of the possible points, while the seventh-grade students (other than at School 05) typically earned between 43-66% of the possible points.

The UCSMP sixth-grade students and seventh-grade students in the matched pairs study scored as well as or better than students in the NAEP or TIMSS samples on all items used from those assessments; non-UCSMP seventh-grade students scored higher than students in the NAEP or TIMMS samples on all but one item, solving an inequality and graphing the solution.

Changes Made in the Field Trial Version for Commercial Publication

In the summer of 2006, the *Transition Mathematics* author team worked to begin making revisions in the materials prior to commercial publication, using insights from the formative aspects of the study, conversations with teachers at the two teachers' meetings, and decisions made about subsequent courses in the Secondary Component. This section describes most of those changes.

In the Field-Trial version, activities were placed between lessons. This placement made it easy for teachers to omit activities. Thus, one decision was to place Activities within the lesson. Although teachers might still choose to omit the activities for a variety of reasons (e.g., time), placement within the narrative of the lesson sends a message that the activities are an integral part of the lesson.

Several other features were added to the text during final preparation, sometimes as a result of ideas tried in Field-Trial versions of other texts. One such feature was the use of Guided Examples in addition to the typical Examples and solutions already found in the text. Guided Examples scaffold the solution with blanks for students to complete to help them get started on a solution. Teachers and students in field studies of other texts liked this feature, and so it was incorporated into the commercial version of *Transition Mathematics*.

Quiz Yourself questions were added to each lesson as a means of helping students and teachers monitor comprehension while completing a lesson; answers to these questions are found at the very end of the lesson. Mental mathematics problems were added at the beginning of each lesson, along with a statement of the Big Idea of the lesson. Projects were included at the end of each chapter; such a feature had been a part of the Second Edition but had not been included in the Field Trial version of the Third Edition because of time constraints when preparing the text. A set of games was developed to build on and extend many of the games from *Everyday Mathematics*.

In addition, the commercial version included a student text bound in a single volume, with pages in four color, a glossary, an index, and answers to some questions. In addition, there was a complete Teacher's Edition, with appropriate notes, additional examples, and ideas for modifying the lesson to address students with special needs or advanced students. Both the Teacher's Edition and the student edition were available electronically. On-line applets provide

opportunities for students to engage with concepts in an active manner, such as applets to illustrate equation solving or geometric ideas.

Some refinements or changes were made in the sequence of mathematical topics. In particular, Chapters 2 and 3 were reversed to move work with decimals and fractions prior to work with variables. Also, the chapter on statistics and variability was moved to the last chapter of the text and a new chapter on three-dimensional geometry and measurement was added.

After the text was commercially published, the Common Core State Standards Initiative (CCSS-I) occurred under the auspices of the National Governors' Association and the Council of Chief State School Officers (NGS & CCSSO, 2010). These standards identify the mathematics content that should be taught in each of grades K-8, and then specify content topics within broad areas (e.g., functions, geometry) at the high school level. As of March 2012, 45 states and the District of Columbia have adopted these standards as their mathematics curriculum frameworks.

Shortly after the release of the Common Core State Standards for Mathematics (CCSSM), UCSMP correlated the *Transition Mathematics* text to the CCSSM, identifying where the content for grade 7 from the CCSSM was covered within *Transition Mathematics* and what content from the CCSSM was not covered in the text because it was covered in earlier or later grades. UCSMP then developed new lessons or modified lessons from *Pre-Transition Mathematics*, *Algebra*, or *Geometry* to address missing content in *Transition Mathematics*. These lessons were available on the publisher's website to schools districts who adopted *Transition Mathematics*.

Discussion

Although it is important that research on the effectiveness of curricula be conducted, current issues within the broader educational climate have made such evaluations more difficult to conduct. The high-stakes accountability environment as a result of the No Child Left Behind legislation means that teachers need to ensure that they have addressed all the tested standards prior to the test, which is administered in the fall in some states and in the spring in others. Consequently, at times teachers in this study set aside their normal curriculum to engage in test preparation and may, as a result, not have time to cover content needed for the next year. In schools with poor results on such assessments in previous years, teachers may have many more requirements related to test preparation or may not be able to consider field-testing a new textbook that could better prepare their students. As previously noted, after *Transition Mathematics* was commercially published, the Common Core State Standards for Mathematics were developed, released, and adopted by many states. Assessments related to those standards are in development, with projected implementation during 2014-2015. It is not clear what implications such standards will have on curriculum development and field-testing in the future, particularly given that many states are also using results on such assessments as part of teacher evaluations.

An additional issue in evaluation studies such as the one reported here is that assessments are generally not part of students' grades. In interpreting the results, it is never clear if students have given the assessments their best effort, even though the results from the assessments reported here appear good overall. Also, students typically took these tests with no additional preparation, so these results are a conservative estimate of what they have learned or might be viewed as an indication of what mathematics students have internalized and solidly understand.

Teachers typically make some adjustments in their curriculum as they progress through the year. Teachers using the Field-Trial version did not have the full curriculum as the beginning of

the year. Also, at three of the six schools, teachers had not previously taught from *Transition Mathematics*. Based on what we have seen in those who have used earlier versions of this and other UCSMP texts, teachers cover more material the second year they are teaching a text than they do the first year. Thus we would expect that results would be better as teachers (and their students) gain familiarity with the text and with the pacing needed to cover at least 10 of the 12 chapters.

Determining what assessments are appropriate to use is always an issue, particularly because there is limited time for assessment. At the middle grades level, it was possible to find a standardized measure that was related to one of the goals of the *Transition Mathematics* course, namely to prepare students for algebra. Nevertheless, the classroom teachers indicated there were numerous items on this assessment for which their students had not had an opportunity to learn or review the content. Similarly, although two of the assessments were constructed by project personnel, classroom teachers indicated students did have an opportunity to learn or review the content needed for the items. Finding the proper balance between content-focused standardized assessments and appropriate project developed assessments is a challenge. Having teachers analyze assessments on an item-by-item basis and then analyzing achievement while controlling for these opportunity-to-learn responses is one way we believe that we can ensure such evaluations are fair and unbiased.

The *Transition Mathematics* text is not a typical prealgebra text, but is a text with expectations related to mathematics literacy, technology, a balance among procedures and concepts as well as skills and applications, and content that integrates prealgebra concepts with geometry, data, and applied arithmetic. Although the comparison curricula also had a similar broad content focus based on their Table of Contents, the comparison texts were typical basal textbooks at seventh-grade, and students would often take a prealgebra course in the eighth grade. In contrast, students successful in *Transition Mathematics* would be expected to take *Algebra* in the eighth grade.

The results from this evaluation study suggest that many students are prepared to complete an algebra course in the eighth grade. In particular, students studying from *Transition Mathematics* will be able to address the content of the CCSSM, engage in mathematical literacy, deal with concepts from a multi-dimensional perspective (skills, properties, uses, and representations), and still be prepared for algebra in the following year.

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Appendix A

School Recruitment Materials

The University of Chicago School Mathematics Project

Call for Schools
2005-2006 Field Test Studies of 3rd editions of
UCSMP *Transition Mathematics* and *Algebra*

Nature of the study

During the 2005-2006 school year, UCSMP will be field-testing a draft of the third editions of the UCSMP texts, *Transition Mathematics* and *Algebra*, in about 10 schools per text. In each school, we will need 4 classes: two with one teacher using the new materials and two comparison classes with a different teacher who is using materials the school is currently using. For *Transition Mathematics*, we are looking for classes at either the 7th or 8th grade; for *Algebra*, we are looking for classes at the 8th or 9th grade.

Obligations of schools and of UCSMP

A study of this kind is a partnership between schools and UCSMP and bestows obligations on each.

Obligations of UCSMP

- **Materials for students in field-test classes**. We will supply text materials for all students in field-test classes free of charge. These materials will be in a soft cover version in three or four parts distributed through the school year. They will be provided for one teacher with two classes, unless some prior arrangement has been made. We supply no materials for comparison classes as they are expected to use the materials currently in place at the school. Because materials will be revised during summer 2006, we will not be able to provide text materials prior to August 15.
- **Materials for teachers of field-test classes**. We will provide a rudimentary teacher's edition to the teachers of field-test classes, including an overview of each chapter, perspectives on each lesson, teaching suggestions, comments on problems, ideas for evaluation, and answers to all questions. We will also provide chapter tests that we will encourage teachers to use.
- **Instruments for field-study evaluations**. We will provide all pretests, posttests, and other evaluation forms for students in both comparison and field-test classes.
- **Expenses incurred by schools**. We are willing to pay postage for all materials sent back to us. Schools should keep receipts and submit them to UCSMP at the end of the study if reimbursement is desired. Phone calls to the university for purposes of the study can be collect.
- **Reports and distribution of results**. Global results for all students in the study, results by school, and results by class in a given school will be sent to that school, usually in the year after the study. Schools participating in the study will not be identified with their results. It is possible that participating schools will be asked whether they wish to be listed in the final commercially published textbook.
- **Honoraria to teachers**. A small honorarium will be provided to both UCSMP and comparison teachers to compensate them for their time in completing the various forms required as part of the study. Honoraria will be paid at the end of the school year and will be contingent upon completing all forms required as part of the study.

Obligations of Participating Schools

- **Students and classes**. Field-test and comparison classes should involve similar students who have had the same previous course work. Optimally, we would like to randomly assign which teacher teaches using the UCSMP materials.
- **Integrity of field-test and comparison classes**. Because we match pairs of classes and report results at the class level, results from students who switch classes are typically eliminated. Hence, schools should be willing to maintain students in their original classes throughout the school year.

- **Materials to be used**. The field-test teacher is expected to use the third edition materials supplied by UCSMP and not to supplement these materials heavily from any other source. The comparison teacher is expected to use the books that the students would normally use if they were not part of the study.
- **Technology access**. We expect that these courses will incorporate the latest in technology, although the actual specifics will not be determined until the writing that occurs during the summer. At a minimum, both UCSMP *Transition Mathematics* and *Algebra* students should have access to graphing calculators during class. Comparison students should have access to the technology that would typically be available for their course. We do *not* provide calculators, computers, or software.
- **Test requirements**. We expect to need five 40-minute periods for testing, two at the beginning of the year and three at the end. We would also like to collect a copy of the tests that both the UCSMP and comparison teachers use throughout the school year for the purposes of assigning grades to students.
- **Special obligations for the UCSMP field-test teachers**. UCSMP field-test teachers are expected to complete chapter evaluation forms upon completing each chapter of the test. In addition, UCSMP teachers will be invited to participate in two one-day meetings at the University of Chicago, once in the fall and once in the spring, generally on a Saturday. All expenses will be paid, and a small honorarium will be provided if school district policies permit.
- **Classroom observations**. We expect to visit all classes, both comparison and UCSMP, at least once during the school year. Schools and teachers need to permit such observations, which will be arranged in advance. In addition, there may be some UCSMP classes in which we will want to conduct extended observations (3-4 days at a time) at several points throughout the year.
- **Interviews with teachers**. We expect to interview both comparison and UCSMP teachers at some point during the year, likely in conjunction with a classroom observation visit.

For further information contact Denisse R. Thompson at 813-974-2687. If your school will be able to meet the above obligations, please print and complete the appropriate application which may be found on the UCSMP website at http://socialsciences.uchicago.edu/ucsmp/. If your school is interested in participating in both the *Transition Mathematics* and *Algebra* studies, please complete separate applications for each.

Applications will be accepted until all study schools are selected.

Anticipated Date of Notification: around May 23, 2005.

Send all application materials via hard copy or email to:

Denisse R. Thompson
Director of Evaluation for UCSMP Third Editions
University of South Florida
College of Education, EDU162
Tampa, FL 33620

813-974-2687
813-974-3837 (fax)
thompson@tempest.coedu.usf.edu

University of Chicago School Mathematics Project

Transition Mathematics 2005-2006 Field Test
Study School Application

Applications will be accepted until all schools are selected.

Contact Information

School District _____ School _____
School Address _____

_____
School Principal _____ Phone _____

Primary contact _____ Title or position _____
Work address (if different from above) _____

_____
Summer address (if different from above) _____

_____
Work phone _____ Home phone _____
e-mail _____

School/Class/Student Information

2005-06 school year for teachers: First day _____Last day_____
2005-06 school year for students: First day _____Last day _____
First day of 2005-2006 school year appropriate for initial testing of students _____
(We would like to test within the first week of classes.)
Grade levels included in the school _____ Total number of students _____
Grade level(s) of students in classes proposed for this study: 6 ____ 7 _____ 8 _____

Please attach a description of the mathematics program of the school that includes the various courses available for students.

Performance level(s) of students in the classes proposed for this study (compared to average performance in your school – check all that apply)
Class 1: High _____ Medium high _____ Average _____ Medium low _____ Low _____
Class 2: High _____ Medium high _____ Average _____ Medium low _____ Low _____
Class 3: High _____ Medium high _____ Average _____ Medium low _____ Low _____
Class 4: High _____ Medium high _____ Average _____ Medium low _____ Low _____
Number of students expected in each class _____

Identify the textbook that will be used in the comparison classes. ISBN:_____
Publisher _____Title _____Year _____
Name(s) of authors _____

Please attach a copy of the title page, the page listing copyright information (usually on the back of the title page), and the table of contents that lists all sections.

Estimate the percentage of the students likely to be in these classes in each category:
White _____ Black _____ Hispanic or Latino _____ Asian _____ Native American _____
ESL _____ LD _____ Gifted _____

Geographical origin of the students likely to be in these classes (in percents):
City _____ Suburban _____ Small town _____ Rural _____

Number of times class meets per week: _____ Minutes per class _____
Which UCSMP texts, if any, has your school district used in the past? None _____
Everyday Mathematics K _____ 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____
TM _____ Algebra _____ Geometry _____ Advanced Algebra _____ FST _____ PDM _____

Has your school previously participated in a UCSMP study? If yes, for which books and in which school years?_____

For the *Transition Mathematics* classes in the study, indicate whether the listed technology is,
(a) expected to be owned by all students,
(b) available in class for student use at all times,
(c) available for student use at some times, or,
(d) available for teacher use in class at all times.
(List all that apply.)

scientific calculators _____ graphing calculators _____ laptop computers _____
spreadsheet _____ Dynamic geometry software (*Geometer's Sketchpad* or *Cabri*) _____
calculators or computer software with symbolic algebra (CAS) capability _____

Teacher Information

Identify the names of the two teachers who will be teaching the classes in this study.
Teacher 1: _____Teacher 2: _____
Which of classes 1-4, School/Class/Student Information Section, would teacher 1 be teaching?
Class ____ and Class ____
Which of classes 1-4, School/Class/Student Information Section, would teacher 2 be teaching?
Class ____ and Class ____

Indicate whether these teachers would be willing to teach either UCSMP or comparison classes.
Teacher 1: UCSMP only ____ Comparison only ____ Either ____
Teacher 2: UCSMP only ____ Comparison only ____ Either ____

Study Checklist

Indicate Yes or No to the following questions.
_____UCSMP could randomly pick the teacher from the two named above to be the one whose classes will use the UCSMP 3rd edition materials.
_____Each class meets for the entire school year.
_____In the middle of the year, at the semester break, students will be able to change classes.

_____Permission to be involved in this study has already been approved by those in the school and district who need to approve it.

_____Students in these classes will be taking high-stakes mathematics tests during the school year. If so, describe the test and its purpose. _____

_____

_____Students in these classes will be taking standardized but not high-stakes mathematics tests during the school year. If so, name the test. _____

_____

_____Could scores of students on high stakes or standardized tests be made available to UCSMP for purposes of this study? _____

_____

Please indicate any other information that you feel would be helpful for us to know in making our decision about the participation of your school in the *Transition Mathematics* study.

Please fax, email, or send a hard copy of the application to:

Denisse R. Thompson
Director of Evaluation for UCSMP Third Editions
University of South Florida
College of Education, EDU162
Tampa, FL 33620

813-974-2687
813-974-3837 (fax)
thompson@tempest.coedu.usf.edu

Appendix B

Textbook Table of Contents

Table of Contents
Transition Mathematics

The University of Chicago School Mathematics Project

TRANSITION MATHEMATICS

Teacher's Edition

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Erica Cheung
Virginia Highstone
Catherine R. Capuzzi
Deborah Heeres
Neva A. Metcalf
Susan Sabrio
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www.WrightGroup.com

Wright Group

Printed in the United States of America.

Send all inquiries to:
Wright Group/McGraw-Hill
P.O. Box 812960
Chicago, IL 60681

ISBN 978-0-07-610999-9
MHID 0-07-610999-2

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Contents

Appendix C

Teacher Instruments

UCSMP

The University of Chicago School Mathematics Project

6030 South Ellis Avenue • Chicago, Illinois 60637

(773) 702-1130 • FAX (773) 702-3114 • ucsmp@uchicago.edu

TEACHER SCRIPT TO SHARE INFORMATION ABOUT THE STUDY WITH STUDENTS

Please read the following to your students near the beginning of the year to inform them about the study.

> *Our class is one of 94 classes in 23 schools in 10 states that have volunteered to be part of a national study of mathematics teaching and learning. In our class a few times during the year, you will take a special mathematics test that is a part of this study. These tests will not affect your grade but you are encouraged to do your best.*

After reading the above statement, ask the students if there are any questions about the study. If there is something you feel you cannot answer, please feel free to contact me at 773-702-8775 or via email (denisse@uchicago.edu) and I will try to provide an answer to any questions.

Thank you for your assistance.

Sincerely,

Denisse R. Thompson
Director of Evaluation
773-702-8775
denisse@uchicago.edu

UNIVERSITY OF CHICAGO SCHOOL MATHEMATICS PROJECT
MATHEMATICS STUDY 2005-2006

Teacher Questionnaire #1

Name _____ Male____ Female___

School _____

Email _____

Phone number _____

1. Education

Degree(s)	Major(s)	Minor(s) (if any)
_____	_____	_____
_____	_____	_____
_____	_____	_____

2. List your teaching certifications. (e.g., Mathematics 7-12, Elementary K-8)
   _____

3. Teaching experience
   Number of years teaching prior to this year _____
   Number of years teaching mathematics prior to this year _____
   Number of years teaching at present school prior to this year _____

4. a. Name of the course involved in this study _____
   b. Please check one of the following:
      ____ UCSMP Third Edition Teacher
      ____ UCSMP Second Edition Teacher
      ____ Other (Please specify the text you are using. _____)
      If teaching from a non-UCSMP text, please attach a copy of the title page, the back of the title page containing the copyright information, and a Table of Contents.
   c. Number of years teaching this course prior to this year _____
   d. Number of years using a UCSMP text for this course prior to this year _____

5. How many minutes does this class meet each day?
   _____M _____Tu _____W _____Th _____F

6. Think about your plans for this mathematics class for the entire year. How important to you in your teaching are each of the following?

   Circle one: ***Of little importance***, ***Somewhat important***, ***Quite important***, or ***Of highest importance***.

   a. Increase students' interest in mathematics
      Of little importance Somewhat important Quite important Of highest importance
   b. Help students learn mathematical concepts
      Of little importance Somewhat important Quite important Of highest importance
   c. Help students learn mathematical algorithms/procedures
      Of little importance Somewhat important Quite important Of highest importance
   d. Help students learn to read mathematics
      Of little importance Somewhat important Quite important Of highest importance
   e. Help students learn to read (non-textbook) mathematics-related materials
      Of little importance Somewhat important Quite important Of highest importance
   f. Help students learn how to solve problems
      Of little importance Somewhat important Quite important Of highest importance
   g. Help students learn to reason mathematically
      Of little importance Somewhat important Quite important Of highest importance
   h. Help students learn how mathematics ideas connect with one another
      Of little importance Somewhat important Quite important Of highest importance
   i. Prepare students for further study in mathematics
      Of little importance Somewhat important Quite important Of highest importance
   j. Help students understand the logical structure of mathematics
      Of little importance Somewhat important Quite important Of highest importance
   k. Help students learn to explain ideas in mathematics effectively
      Of little importance Somewhat important Quite important Of highest importance
   l. Help students learn to perform computations with speed and accuracy
      Of little importance Somewhat important Quite important Of highest importance
   m. Help students prepare for standardized tests
      Of little importance Somewhat important Quite important Of highest importance
   n. Help students learn to use a calculator as a tool for learning mathematics
      Of little importance Somewhat important Quite important Of highest importance
   o. Help students learn to use a computer as a tool for learning mathematics
      Of little importance Somewhat important Quite important Of highest importance

7. Think about your plans for this mathematics class for the entire year. About how often do you plan to do each of the following in your mathematics instruction?

   Circle one: ***Almost Never***, ***Sometimes*** (once or twice a month), ***Often*** (once or twice a week), or ***Almost All Mathematics Lessons***.

   a. Introduce content through formal presentations

      Almost never Sometimes Often Almost all

   b. Pose open-ended questions

      Almost never Sometimes Often Almost all

   c. Have students listen and take notes during presentations by the teacher

      Almost never Sometimes Often Almost all

   d. Engage the whole class in discussions

      Almost never Sometimes Often Almost all

   e. Require students to explain their reasoning when giving an answer

      Almost never Sometimes Often Almost all

   f. Have students work in small groups

      Almost never Sometimes Often Almost all

   g. Have students engage in mathematical activities using concrete materials

      Almost never Sometimes Often Almost all

   h. Have students use mathematical concepts to solve applied problems

      Almost never Sometimes Often Almost all

   i. Ask students to explain concepts to one another

      Almost never Sometimes Often Almost all

   j. Have students work on extended mathematics investigations or projects (e.g., problems requiring more than a week)

      Almost never Sometimes Often Almost all

   k. Ask students to consider alternative methods for solutions

      Almost never Sometimes Often Almost all

   l. Ask students to use multiple representations (e.g., numerical, graphical, geometric, etc.)

      Almost never Sometimes Often Almost all

   m. Help students see connections between mathematics and other disciplines

      Almost never Sometimes Often Almost all

   n. Assign mathematics homework

      Almost never Sometimes Often Almost all

   o. Have students write about mathematics

      Almost never Sometimes Often Almost all

8. What do you expect to be your greatest challenge in teaching this class this year?

9. What else should we know about your participation in this study?

UCSMP

The University of Chicago School Mathematics Project

6030 South Ellis Avenue • Chicago, Illinois 60637

(773) 702-1130 • FAX (773) 702-3114 • ucsmp@uchicago.edu

Teacher End-of-Year Questionnaire

Name _____

School _____

1. a. Name of the course involved in this study _____

   b. Please check one of the following:

   ____ UCSMP Third Edition Teacher

   ____ UCSMP Second Edition Teacher

   ____ Other (Please specify the text you are using. _____)

2. About what percentage of each week did you devote to instruction in the following arrangements?

   a. whole class instruction _____

   b. small cooperative groups _____

   c. individual seatwork _____

   d. other _____

   (Please specify. _____)

3. About what percentage of a typical lesson is devoted to the following activities?

   a. warm-up exercises/problems _____

   b. review of homework assignment _____

   c. introduction of new content _____

   d. attendance, classroom management _____

   e. other _____

   (Please specify. _____)

4. a. What is the marking period structure for your school?

   _____ report cards every six weeks

   _____ report cards every nine weeks

   _____ other (Please specify. _____)

   b. In a given marking period, how many tests did you typically give, on average? _____

   c. Did tests take the entire class period? _____ Yes _____ No

d. In a given marking period, how many quizzes did you typically give, on average? _____

e. Did quizzes take the entire class period? _____ Yes _____ No

5. On the average, how many minutes of homework did you expect the typical student to do each day?

_____ 0-15 minutes per day
_____ 16-30 minutes per day
_____ 31-45 minutes per day
_____ 46-60 minutes per day
_____ more than 60 minutes per day

6. What calculator technology was available for use by the majority of students **during this mathematics class**? (Check all that apply.)

_____ calculators not available
_____ a class set of four-function calculators
_____ a class set of scientific calculators
_____ student-owned scientific calculators
_____ class set of graphing calculators
_____ student-owned graphing calculators
_____ the loaner calculators provided by UCSMP
_____ other (Please specify. _____)

7. About how often did students use calculator technology **during this mathematics class**?

_____ almost every day
_____ 2-3 times per week
_____ 2-3 times a month
_____ less than once a month
_____ almost never

8. For what did students use calculator technology **in this mathematics class**? (Check all that apply.)

_____ checking answers
_____ doing computations
_____ solving problems
_____ graphing equations
_____ other (specify) _____
_____ working with a spreadsheet
_____ making tables
_____ analyzing data
_____ finding equations to model data

9. How helpful was calculator technology for students learning mathematics **in this mathematics class**?

_____ very helpful
_____ somewhat helpful
_____ not very helpful

10. How often did you expect students to read their mathematics textbook?

_____ almost every day
_____ 2-3 times per week
_____ 2-3 times a month
_____ less than once a month
_____ almost never

11. How often did these things happen during this mathematics class?

		Daily	Frequently	Seldom	Never
a.	Teacher read aloud in class.	_____	_____	_____	_____
b.	Students read aloud in class.	_____	_____	_____	_____
c.	Students read silently in class.	_____	_____	_____	_____
d.	Students discussed the reading in class.	_____	_____	_____	_____

12. How important do you think it is for students to read their mathematics text in order to understand mathematics?

_____ very important
_____ somewhat important
_____ not very important

13. How often did you expect students to write about mathematics?

_____ almost every day
_____ 2-3 times per week
_____ 2-3 times a month
_____ less than once a month
_____ almost never

14. How often did these things happen during this mathematics class when students solved problems?

		Daily	Frequently	Seldom	Never
a.	Students wrote answers only.	_____	_____	_____	_____
b.	Students wrote a few steps in their solutions.	_____	_____	_____	_____
c.	Students wrote complete solutions.	_____	_____	_____	_____
d.	Students explained or justified their work.	_____	_____	_____	_____
e.	Students wrote in journals.	_____	_____	_____	_____
f.	Students did a project.	_____	_____	_____	_____

15. How important do you think it is for students to write about mathematics to show they understand?

_____ very important
_____ somewhat important
_____ not very important

16. Think about your mathematics class this past year. How important to you in your teaching were each of the following?

Circle one: ***Of little importance***, ***Somewhat important***, ***Quite important***, or ***Of highest importance***.

a. Increase students' interest in mathematics

Of little importance Somewhat important Quite important Of highest importance

b. Help students learn mathematical concepts

Of little importance Somewhat important Quite important Of highest importance

c. Help students learn mathematical algorithms/procedures

Of little importance Somewhat important Quite important Of highest importance

d. Help students learn to read mathematics

Of little importance Somewhat important Quite important Of highest importance

e. Help students learn to read (non-textbook) mathematics-related materials

Of little importance Somewhat important Quite important Of highest importance

f. Help students learn how to solve problems

Of little importance Somewhat important Quite important Of highest importance

g. Help students learn to reason mathematically

Of little importance Somewhat important Quite important Of highest importance

h. Help students learn how mathematics ideas connect with one another

Of little importance Somewhat important Quite important Of highest importance

i. Prepare students for further study in mathematics

Of little importance Somewhat important Quite important Of highest importance

j. Help students understand the logical structure of mathematics

Of little importance Somewhat important Quite important Of highest importance

k. Help students learn to explain ideas in mathematics effectively

Of little importance Somewhat important Quite important Of highest importance

l. Help students learn to perform computations with speed and accuracy

Of little importance Somewhat important Quite important Of highest importance

m. Help students prepare for standardized tests

Of little importance Somewhat important Quite important Of highest importance

n. Help students learn to use a calculator as a tool for learning mathematics

Of little importance Somewhat important Quite important Of highest importance

o. Help students learn to use a computer as a tool for learning mathematics

Of little importance Somewhat important Quite important Of highest importance

17. Think about your mathematics class this past year. About how often did you do each of the following in your mathematics instruction?

    Circle one: ***Almost Never***, ***Sometimes*** (once or twice a month), ***Often*** (once or twice a week), or ***Almost All Mathematics Lessons***.

    a. Introduce content through formal presentations

    Almost never Sometimes Often Almost all

    b. Pose open-ended questions

    Almost never Sometimes Often Almost all

    c. Have students listen and take notes during presentations by the teacher

    Almost never Sometimes Often Almost all

    d. Engage the whole class in discussions

    Almost never Sometimes Often Almost all

    e. Require students to explain their reasoning when giving an answer

    Almost never Sometimes Often Almost all

    f. Have students work in small groups

    Almost never Sometimes Often Almost all

    g. Have students engage in mathematical activities using concrete materials

    Almost never Sometimes Often Almost all

    h. Have students use mathematical concepts to solve applied problems

    Almost never Sometimes Often Almost all

    i. Ask students to explain concepts to one another

    Almost never Sometimes Often Almost all

    j. Have students work on extended mathematics investigations or projects (e.g., problems requiring more than a week)

    Almost never Sometimes Often Almost all

    k. Ask students to consider alternative methods for solutions

    Almost never Sometimes Often Almost all

    l. Ask students to use multiple representations (e.g., numerical, graphical, geometric, etc.)

    Almost never Sometimes Often Almost all

    m. Help students see connections between mathematics and other disciplines

    Almost never Sometimes Often Almost all

    n. Assign mathematics homework

    Almost never Sometimes Often Almost all

    o. Have students write about mathematics

    Almost never Sometimes Often Almost all

18. For each of the following, give your opinion about each of the statements related to the textbook you are using for this class.
Strongly agree, ***Agree***, ***No opinion***, ***Disagree***, ***Strongly disagree***

a. This textbook helps develop problem-solving skills.

Strongly agree Agree No opinion Disagree Strongly disagree

b. This textbook needs more exercises for practice of skills.

Strongly agree Agree No opinion Disagree Strongly disagree

c. This textbook explains concepts clearly.

Strongly agree Agree No opinion Disagree Strongly disagree

d. This textbook provides good suggestions for activities.

Strongly agree Agree No opinion Disagree Strongly disagree

e. This textbook provides good suggestions for assignments.

Strongly agree Agree No opinion Disagree Strongly disagree

f. This textbook needs more examples of the applications of mathematics.

Strongly agree Agree No opinion Disagree Strongly disagree

g. This textbook provides good suggestions for the use of calculators.

Strongly agree Agree No opinion Disagree Strongly disagree

h. This textbook provides good suggestions for the use of graphing features of a calculator.

Strongly agree Agree No opinion Disagree Strongly disagree

i. This textbook provides good suggestions for the use of table features on a calculator.

Strongly agree Agree No opinion Disagree Strongly disagree

j. This textbook provides good suggestions for the use of spreadsheets.

Strongly agree Agree No opinion Disagree Strongly disagree

19. a. Are the students in this class required to take a state test this school year (such as tests to meet NCLB requirements)?

_____ Yes (If yes, please answer 19b and 19c.)

_____ No (If no, please answer 19d.)

b. If yes, about how much time did you spend out of the textbook in review for this test?
_____

c. If yes, what influenced the amount of time you spent on review (e.g., district requirements, school requirements, your experience with the requirements for the test)?

d. If no, why was review not necessary?

20. Below is some content that is covered in UCSMP *Transition Mathematics*. Check any that you think a typical teacher of this course would need some refresher work in before teaching for the first time.

_____ using a graphing calculator

_____ using a spreadsheet

_____ using a geometric drawing tool

_____ models for the operations

_____ transformations

_____ nets for geometric solids

_____ basic statistics

_____ box plots

_____ confidence intervals

_____ time series

_____ basic probability

_____ independent/dependent events

_____ conditional probability

21. What was your greatest challenge in teaching this class this year?

22. If you had the choice, would you teach from this text again next school year? Please explain why or why not.

23. Are there any special circumstances related to this class that we should know about that might help us understand the student achievement data?

THANK YOU!!! THANK YOU!!! THANK YOU!!!

Teacher Interview Protocol #1

Teacher Name (Code) _____

School _____

Curriculum _____

Date _____

Interviewer _____

The purpose of this interview is
(1) to clarify and confirm information about the class that we have obtained thus far from you or from the district,
(2) to check to see how things are going, and
(3) to answer any questions you may have about the study, or in the case of UCSMP teachers about the curriculum.

I would like to audio-tape the interview if you don't mind. Do you agree to be audio-taped?

1. a. Where does this class fit within the mathematics program at the school? That is, are there other courses that students at this grade level can take? (Probe for whether this class is at the high end, typical, at the low end, etc.)

   b. What courses might students take next year?

2. How were students assigned to this course? (Probe for random assignment, etc. If the teacher does not know, try to find out what individual at the school might know.)

3. What things would you most like students to learn from this course this year? (Probe for specific content if the teacher does not mention specific topics.)

4. How does the year seem to be going thus far? (Probe for any special issues, challenges, problems that have arisen.)

5. a. To what extent was the class period that I observed typical of your classes at this level this year?

   b. (If the teacher has several sections of the same course) How does the class I observed compare to other sections of the same course that you teach? (Probe for whether the class is about the same, higher, or lower.)

6. I know that we have asked you about the use of technology on the chapter evaluation/coverage forms as its use relates to that chapter. (Ask this question depending on technology responses to the form, possibly asking this question only of UCSMP Third Edition teachers.)
   a. In a broader sense, how has the presence of calculator technology influenced how you have approached the course? (Probe for influence on both content taught and instructional strategies.)

   b. What issues, if any, have arisen because of the presence of the technology?

7. (For UCSMP teachers only who have taught from the Second Edition)
   a. How would you compare the Third Edition with the Second Edition, in terms of student expectations, prerequisite knowledge, etc.?

   b. How would you compare the beginning of this year with UCSMP with the beginning of previous years?

8. What questions or comments do you have about the study we are conducting?

Thank you very much for your time.

Teacher Interview Protocol #2

Teacher Name (Code) _____

School _____

Curriculum _____

Date _____

Interviewer _____

The purpose of this interview is
(1) to clarify and confirm information about the class that we have obtained thus far from you or from the district,
(2) to check to see how things are going,
(3) to answer any questions you may have about the study, or in the case of UCSMP teachers about the curriculum, and
(4) to probe for additional insights related to the lessons or classes observed.

I would like to audio-tape the interview if you don't mind. Do you agree to be audio-taped?

1. a. Where does this class fit within the mathematics program at the school? That is, are there other courses that students at this grade level can take? (Probe for whether this class is at the high end, typical, at the low end, etc. Probe for what courses students had last year.)

   b. What courses might students take next year?

2. How were students assigned to this course? (Probe for random assignment, etc. If the teacher does not know, try to find out what individual at the school might know.)

3. What things would you most like students to learn from this course this year? (Probe for specific content if the teacher does not mention specific topics.)

4. How does the year seem to be going thus far? (Probe for any special issues, challenges, problems that have arisen.)

5. a. To what extent was the class period that I observed typical of your classes at this level this year?

b. (If the teacher has several sections of the same course) How does the class I observed compare to other sections of the same course that you teach? (Probe for whether the class is about the same, higher, or lower.)

c. What were the main instructional goals, in terms of content or processes, for the classes that I have observed during this visit?

d. What, if anything, surprised you about students' interaction with the content in these lessons that I observed? (Probe for any special insights as well as any special difficulties.)

6. We have asked you about the use of technology on the chapter evaluation/coverage forms as its use relates to that chapter. (Ask this question depending on technology responses to the form, possibly asking this question only of UCSMP Third Edition teachers.)
   a. In a broader sense, how has the presence of calculator technology influenced how you have approached the course? (Probe for influence on both content taught and instructional strategies.)

   b. What issues, if any, have arisen because of the presence of the technology?

   c. What, if anything, have you expected in terms of technology that is not present in the materials?

   d. What, if any, additional teacher support would you have liked related to technology?

   e. How have your students responded/reacted to the technology integration?

   f. To what extent has the use of technology influenced students' learning of mathematics? (Probe for positive and negative influences for the types of technology available, including graphing calculator, CAS, spreadsheets, geometric drawing tool, fraction calculator, etc.)

7. I would like to discuss several features of the curriculum materials and/or of instruction with the materials.
   a. What are your expectations for students to read the text? (Depending on the response, probe for how they handle reading, the reading level, etc.)

   b. Discuss your expectations to have students write about mathematics. (Depending on response, probe for the level of support for this activity that is in the text.)

   c. Describe how you use the end of chapter materials in your book. (e.g., SPUR Review, Self Test, or equivalent)

d. Describe your typical classroom structure in terms of how students work. (Probe for teacher directed lesson, students working in small groups, students working on activities, etc.)

e. What are your expectations related to active learning by students in your mathematics class? (Depending on the response, probe for the extent to which the curriculum materials facilitate active learning.)

8. (For UCSMP teachers only who have taught from the Second Edition)
   a. How would you compare the Third Edition with the Second Edition, in terms of student expectations, prerequisite knowledge, etc.?

   b. How would you compare the beginning of this year with UCSMP with the beginning of previous years?

9. What questions or comments do you have about the study we are conducting?

Thank you very much for your time.

University of Chicago School Mathematics Project
Transition Mathematics: Third Edition

CHAPTER 1 EVALUATION FORM

Teacher_____ School _____

Date Chapter Began _____ Date Chapter Ended _____ No. Class Days (Including Tests) ____

1. Please complete the table below. In column A circle the number of days you spent on each lesson. In columns B and C, rate the text and questions of each lesson using the following scale.

   1 = Disastrous; scrap entirely. (Reason?) 2 = Poor; needs major rewrite. (Suggestions?)
   3 = OK; some big changes needed. (Suggestions?) 4 = Good; minor changes needed. (Suggestions?)
   5 = Excellent; leave as is.

   In columns D and E, respectively, list the specific questions you assigned in the lesson and comment on any parts of the lesson text or questions you think should be changed. Use the other side or an additional sheet of paper if you need more space.

	A	**B**	**C**	**D**	**E**
Lesson	Circle the number of days you spent on the lesson	Rating: Lesson Text	Rating: Questions	Questions Assigned	Comments
1-1	0 0.5 1 1.5 2 2.5				
1-1 Activity	0 0.5 1 1.5 2 2.5				
1-2	0 0.5 1 1.5 2 2.5				
1-3	0 0.5 1 1.5 2 2.5				
1-4	0 0.5 1 1.5 2 2.5				
1-5	0 0.5 1 1.5 2 2.5				
1-6	0 0.5 1 1.5 2 2.5				
1-7	0 0.5 1 1.5 2 2.5				
1-8	0 0.5 1 1.5 2 2.5				
1-9	0 0.5 1 1.5 2 2.5				
Self-Test	0 0.5 1 1.5 2 2.5				
Chapter Review	0 0.5 1 1.5 2 2.5				

2. Overall rating of this chapter. (Use the same rating scale as at the top of the page.) _____

3. What comments do you have on the sequence, level of difficulty, or other specific aspects of the content of this chapter?

4. As we revise the student materials for this chapter,

   a. What should we definitely not change?

   b. What should we definitely change? What ideas do you have for changes that should be made?

5. As we revise the Teacher's Notes for this chapter,
   a. What should we definitely not change?

   b. What should we definitely change? What ideas do you have for changes that should be made?

6. Did you use any UCSMP Second Edition materials during this chapter (Lesson Masters, Computer Masters, etc.)? Yes _____ No _____

   If yes, how and when?

7. While teaching this chapter, did you supplement the text with any materials other than those mentioned in Question 6? Yes _____ No _____

   If yes, what materials did you use and when?

   Why did you use these materials? (If possible, please enclose a copy of the materials you used.)

8. a. Did you as the teacher demonstrate or use a calculator with this chapter? Yes _____ No _____

   b. If yes, how did you use the calculator?

   c. What comments or suggestions do you have about the way calculator technology is incorporated into this chapter?

9. a. Did your students use a calculator with this chapter? Yes _____ No _____

   b. If yes, how did they use the calculator?

10. a. Did you as the teacher demonstrate or use a computer with this chapter? Yes _____ No _____

    b. If yes, how did you use the computer?

    c. What comments or suggestions do you have about the way computer technology is incorporated into this chapter?

11. a. Did your students use a computer with this chapter? Yes _____ No _____

    b. If yes, how did they use the computer?

12. Did you check out the loaner calculators to students? Yes _____ No _____

    If no, why not?

For this chapter, what technology access did students have other than the loaner calculators?

13. Did you use the test for this chapter that we provided in the Teacher's Notes? Yes _____ No _____

    If yes, what suggestions do you have for improvement?

    If no, what specific reasons influenced your decision not to use the test?

14. Other comments? Attach additional sheets as needed.

Please return this form, along with a copy of the chapter test you administered to students, to

Denisse R. Thompson
UCSMP
6030 South Ellis Ave.
Chicago, IL 60637
773-702-8775
denisse@uchicago.edu

University of Chicago School Mathematics Project

Mathematics Study 2005-2006

CHAPTER COVERAGE FORM

Teacher _____ School _____

Number and Title of Chapter Taught _____

Date Chapter Began _____ Date Chapter Ended _____ No. Class Days (Including Tests)____

1. Please complete the table below. In Column A, indicate what lessons you taught from this chapter. In Column B, list the specific questions you assigned in the lesson. In Column D, please make any comments about the lesson.

A	**B**	**C**
Lesson Number	Questions Assigned	Comments

2. On a scale from 1 (disastrous) to 5 (excellent), how would you rate this chapter? _____

3. a. Did you as the teacher demonstrate or use a calculator with this chapter? Yes _____ No _____

   b. If yes, how did you use the calculator?

   c. What comments or suggestions do you have about the way calculator technology is incorporated into this chapter?

4. a. Did your students use a calculator with this chapter? Yes _____ No _____

   b. If yes, how did they use the calculator?

5. a. Did you as the teacher demonstrate or use a computer with this chapter? Yes _____ No _____

   b. If yes, how did you use the computer?

   c. What comments or suggestions do you have about the way computer technology is incorporated into this chapter?

6. a. Did your students use a computer with this chapter? Yes _____ No _____

   b. If yes, how did they use the computer?

7. Did you use the test for this chapter that was provided by the publisher? Yes _____ No _____

   If no, what specific reasons influenced your decision not to use the test?

8. Other comments? Attach additional sheets as needed.

Please return this form, along with a copy of the chapter test you administered to students, to

Denisse R. Thompson
UCSMP
6030 South Ellis Ave.
Chicago, IL 60637
773-702-8775
denisse@uchicago.edu

Teacher _____

School _____

Transition Mathematics and Comparison Curriculum: Directions for Pretests

For the study involving *Transition Mathematics* and a comparison curriculum (when applicable), there are two pretests: the *Terra Nova, Level 17* (mathematics section only) and a *Middle School Mathematics Test* developed by UCSMP. We would prefer that you give the *Terra Nova* first, if possible; however, if there is some reason for giving the other test first, then just please note that below.

Because the *Terra Nova* is a standardized test, test security is extremely important. The tests are numbered and we ask that you double-check that all tests are returned. Please also ensure that students do not get unauthorized access to the tests. We are sending you

- _____ *Terra Nova* tests numbered _____,
- _____ punch out rulers numbered _____,
- _____ *Middle School Mathematics Tests* numbered _____,
- and _____ answer sheets.

Responses for both tests are to be made on the same answer sheet. On side 2,

- use the region for Test 2 (numbers 1-32) for the *Terra Nova* and
- use the region for Test 2 (numbers 33-60) for the *Middle School Mathematics Test*.

Date *Terra Nova* given: _____

Date *Middle School Mathematics Test* given: _____

Directions for completing the answer sheets:

1. Students should use a No. 2 pencil for all responses.
2. In the appropriate section on the front side of the answer sheet, have students complete their first and last name (no nicknames), their school, and their class period.
3. Have students circle Male or Female as appropriate.
4. Have students bubble their name in the appropriate columns.
5. Have students bubble the grade.
6. Please leave ID number blank as we will assign an id number to the student for the purposes of the study.

Administration of the Terra Nova:

NOTE: We are not using the *Terra Nova* answer sheets. All responses to the mathematics portion of the *Terra Nova* should be made in the region marked Test 2 (numbers 1-32) on the second side of the answer sheet.

Please follow the directions for administration of this test so that norm comparisons are meaningful.

1. Enclosed is an official set of directions for the *Terra Nova* standardized test. Directions for administering the mathematics portion begin on page 15. Some modifications are necessary as we are not using the official answer sheet.
   a. The rulers that accompany the *Terra Nova* should be returned, despite the directions to the contrary in the administration booklet.
   b. Students should NOT write in the booklet. Any work should be done on scrap paper, which should be collected and discarded.
   c. Students may NOT use calculators on any portion of the *Terra Nova*.

2. When you are ready to begin, make sure that students know that answers should be placed in the Test 2 region of their answer sheets.

3. a. As indicated in the Directions for Administration, remind students that they should not write in the test booklet.
   b. Follow the directions regarding the sample questions. However, there is no place on the provided answer sheets to bubble the response to the sample questions.

4. Follow the directions for the administration of Part 1, which covers questions 1-9. Students are allowed **10 minutes** for this part.

5. After a brief rest depending on the needs of your class, follow the directions for the administration of Part 2, which covers questions 10-32. Students are allowed **30 minutes** for this part.

6. After completion of the *Terra Nova* tests, collect the answer sheets and the test booklets. Make sure that all tests, answer sheets, and punch-out rulers are returned.

7. Record the date on which you administered the *Terra Nova* on the appropriate blank at the beginning of this set of directions.

Administration of the Middle School Mathematics Test:

NOTE: Students will use the same answer sheet for this test as they used for the *Terra Nova*. Answers will be marked in the answer sheet region for Test 2, numbers 33-60.

1. Students should not write on the test. All work should be completed on scratch paper which should be collected and discarded.

2. Students should NOT use calculators.

3. Students should be given **40 minutes** to complete this test.

4. After completion of the tests, collect the answer sheets and the test booklets. Make sure all tests and answer sheets are returned.

5. Record the date on which you administered the *Middle School Mathematics Test* on the appropriate blank at the beginning of this set of directions.

Miscellaneous:

1. If students are absent when you administer the pretests, feel free to administer the tests to them at a later date if they are back within a couple of days. Just make a note on their answer sheet that they took the test at a different time. We would like to maximize the number of students who take the initial tests.

2. Return the tests, answer sheets, punch-out rulers, and this set of directions to

   Denisse R. Thompson
   UCSMP Director of Evaluation
   6030 South Ellis Ave
   Chicago, IL 60637
   773-702-8775

   A shipping label for DHL is enclosed, which arranges for billing to us. You can contact DHL at 1-800-225-5345 or via online at www.dhl-usa.com to arrange for them to pick up the package.

Thank you for your assistance with the study.

Teacher _____

School _____

Transition Mathematics and Comparison Curriculum: Directions for Posttests

General Comments

For the study involving *Transition Mathematics* and a comparison curriculum (when applicable), there are three posttests and a brief student information form: the *Iowa Algebra Aptitude Test* (a standardized measure); the *Algebra/Geometry Readiness Test: Part One* (white); the *Algebra/Geometry Readiness Test: Part Two* (yellow); and the *Middle School Mathematics: Student Information Form* (celery color, to be given on the same day as the *Algebra/Geometry Readiness Test: Part Two*). We would prefer that you give the *Iowa Algebra Aptitude Test* first, if possible, followed by the *Algebra/Geometry Readiness Test: Part One* (multiple choice), and the *Algebra/Geometry Readiness Test: Part Two* (constructed response). However, if there is some reason for giving the tests in another order, then just please note that below.

It is critical that you have all your students take all three posttests. We generally only consider data analysis for those students for whom we have all test data. As you can understand, we do not want to lose any students from the sample because they miss one of the tests. It is essential that the tests be taken both by students using the Third Edition UCSMP materials and the students in the comparison classes, when such classes exist.

Because we want to use the data to inform revisions of the UCSMP materials, please return the tests as soon as your students have taken them. If you need to keep a test or two for make-ups, please do that and try to have students make up any missed tests and then send those results separately. Please do not keep the bulk of your tests for more than a day or two after your students have taken them.

We will be sharing the test results with you once they are analyzed, likely in the early fall.

A DHL shipping label for two-day express is included for return mailing. We have asked the UCSMP Third Edition teacher to collect all materials and return them back to the project. Once the package is ready for return mail, you can contact DHL at 1-800-225-5345 or via online at www.dhl-usa.com to arrange for them to pick up the package.

I will be sending you a final teacher questionnaire, similar to the one you completed at the beginning of the school year, in early May. I will send this via regular mail and include the information for payment of your honorarium once all student and teacher materials are returned.

Iowa Algebra Aptitude Test

Because the *Iowa Algebra Aptitude Test* is a standardized test, test security is extremely important. The tests are numbered and we ask that you double-check that all tests are returned. Please also ensure that students do not get unauthorized access to the tests. We are sending you one class set of tests.

- _____ *Iowa Algebra Aptitude Test* numbered _____,
- _____ answer sheets for the *Iowa Algebra Aptitude Test*,

Date *Iowa Algebra Aptitude Test* given: _____

Administration of the Iowa Algebra Aptitude Test:

1. Students should use a No. 2 pencil for all responses.
2. In the appropriate section on the front side of the answer sheet, have students complete their first and last name (no nicknames) and bubble their name.
3. Everyone is completing **Form 1** of the test.
4. Have students bubble Male or Female as appropriate.
5. Leave Student Number blank. We will enter the id number that was assigned to this student at the beginning of the year for the purposes of the study.
6. Have students complete the school, their teacher's name, and their grade.
7. In the section marked City (System), have students indicate their class period.

Please follow the directions for administration of this test so that norm comparisons are meaningful.

1. Enclosed is an official set of directions for the *Iowa Algebra Aptitude Test*. We will be machine scoring these tests and those directions begin on page 6.
   a. Students should NOT write in the booklet. Any work should be done on scrap paper, which should be collected and discarded.
   c. Students may NOT use calculators on any portion of the *Iowa Algebra Aptitude Test*.

2. a. As indicated in the Directions for Administration, remind students that they should not write in the test booklet.
   b. Follow the directions regarding the sample questions in each part.

3. Follow the directions for administering each part of the test.
   a. Part A takes **10 minutes**.
   b. Part B takes **8 minutes**.
   c. Part C takes **8 minutes**.
   d. Part D takes **10 minutes**.

   **Please adhere to the time limits. If there are any anomalies, please make note of them when you return your tests.

4. After completion of the *Iowa Algebra Aptitude Test*, collect the answer sheets and the test booklets. Make sure that all tests and answer sheets are returned.

5. Record the date on which you administered the *Iowa Algebra Aptitude Test* on the appropriate blank at the beginning of this set of directions.

Algebra/Geometry Readiness Test: Part One (white)

NOTE: The red answer sheets will be used for this test. Answers will be marked in the answer sheet region for Test 2, numbers 1-40. We are sending you one class set of tests.

- _____ *Algebra/Geometry Readiness Test: Part One* numbered _____,
- _____ answer sheets for the *Algebra/Geometry Readiness Test: Part One*,

Date *Algebra/Geometry Readiness Test: Part One* given: _____

1. Students should use a No. 2 pencil for all responses.

2. In the appropriate section on the front side of the answer sheet, have students complete their first and last name (no nicknames), their school, and their class period.

3. Have students circle Male or Female as appropriate.

4. Have students bubble their name in the appropriate columns.

5. Have students bubble their grade level.

6. Please leave ID number blank as we will assign the id number given to this student at the beginning of the year for the purposes of the study.

7. Students should not write on the test. All work should be completed on scratch paper which should be collected and discarded.

8. Students should NOT use calculators.

9. Students should be given **40 minutes** to complete this test.

10. After completion of the tests, collect the answer sheets and the test booklets. Make sure all tests and answer sheets are returned.

11. Record the date on which you administered the *Algebra/Geometry Readiness Test: Part One* on the appropriate blank at the beginning of this set of directions.

Algebra/Geometry Readiness Test: Part Two (yellow)

We are sending you enough tests for one per student.

- _____ *Algebra/Geometry Readiness Test: Part Two* numbered _____.

Date *Algebra/Geometry Readiness Test: Part Two* given: _____

1. Have students complete the information on the front of the test booklet.

2. Students should write all responses in the test booklet itself.

3. Students MAY use a calculator. We are interested in knowing the model and capabilities of the calculator being used, so please have students complete those questions.

4. Students should be given **35 minutes** to complete the test.

5. After completion of the tests, collect the answer sheets and the test booklets. Make sure all tests and answer sheets are returned.

6. Record the date on which you administered the *Algebra/Geometry Readiness Test: Part Two* on the appropriate blank at the beginning of this set of directions.

Middle School Mathematics: Student Information Form (celery – to be given on the same day as the Algebra/Geometry Readiness Test: Part Two)

We are sending you enough information forms for one per student.

- _____ *Middle School Mathematics: Student Information Form*

Date *Middle School Mathematics: Student Information Form* administered: _____

Note: As I am preparing these materials for shipment, we are waiting for some final university approvals. This brief survey may be sent in a separate package at the beginning of next week if the approval is not received before the package must be mailed.

1. Have students complete the information at the beginning of the form.

2. Students should complete all responses on the form itself.

3. For confidentiality purposes, please have students place their survey in the enclosed envelope as soon as they have completed the form.

4. After all forms have been completed and returned, please seal the envelope.

5. Record the date you administered the *Middle School Mathematics: Student Information Form* on the appropriate blank at the beginning of this section of directions.

Teacher Opportunity-to-Learn Questionnaire

To help us understand the data, we are asking you to complete the Opportunity-to-Learn Questionnaire for the posttest measures. You simply need to circle the appropriate response to questions 1 and 2 for each of the items on the posttests.

If there are any questions, please do not hesitate to contact me:

Email: denisse@uchicago.edu
Cell: 813-545-2180

I will be at the NCTM meeting the week of April 24 but can be reached via my cell and will try to check email regularly.

THANK YOU THANK YOU THANK YOU

FOR ALL YOUR HELP IN ADMINISTERING THESE FOUR INSTRUMENTS.

UCSMP

The University of Chicago School Mathematics Project

6030 South Ellis Avenue • Chicago, Illinois 60637

(773) 702-1130 • FAX (773) 702-3114 • ucsmp@uchicago.edu

Directions for Administering of
***Middle School Mathematics: Student Information Form* (green)**

Teacher _____ School _____

The *Middle School Mathematics: Student Information Form* may be administered on the same day as the *Algebra/Geometry Readiness Test: Part Two*.

We are sending you enough information forms and UCSMP envelopes for one per student.

- _____ *Middle School Mathematics: Student Information Form*

Date *Middle School Mathematics: Student Information Form* administered: _____

1. Have students complete the information at the beginning of the form. They should NOT put their names on the form.

2. Students should complete all responses on the form itself.

3. For confidentiality purposes, please have students place their survey in the enclosed UCSMP envelope as soon as they have completed the form and have them seal the envelope.

4. Collect all forms for the class and enclose in the large manila envelope. Please indicate the class period and teacher on the outside of the envelope.

5. Record the date you administered the *Middle School Mathematics: Student Information Form* on the appropriate blank at the beginning of this section of directions.

For the UCSMP Third Edition teacher:

6. Please have your principal sign the attached note (goldenrod paper) related to administering of the survey. Our Institutional Review Board has asked us to obtain this documentation.

7. Please collect the envelopes with student forms from your comparison teacher, if applicable, and mail back in the box with your posttests. If I had concerns about enough space for this, I have enclosed additional DHL mailing labels so you can return these student forms separately.

Again, **THANKS** for all your help in bringing the study to a close this year. I will be sending everyone an individual teacher questionnaire form, hopefully by the end of next week. This will also include information for the final end-of-year honorarium to be paid once everything has been returned.

Appendix D

Student Instruments

UCSMP

The University of Chicago School Mathematics Project

Test Number _____

Middle School Mathematics Test

Do not open this booklet until you are told to do so.

This test contains 28 questions. You have 40 minutes to take the test.

1. All questions are multiple-choice. Some questions have four choices and some have five. There is only one correct answer to each question.

2. Using the portion of the answer sheet marked **TEST 2**, fill in the circle • corresponding to your answer. The questions on this test start at number 33.

3. If you want to change an answer, completely erase the first answer on your answer sheet.

4. If you do not know the answer, you may guess.

5. Use the scrap paper provided to do any writing or drawing. **DO NOT MAKE ANY STRAY MARKS IN THE TEST BOOKLET OR ON THE ANSWER SHEET.**

6. You may **not** use a calculator.

DO NOT TURN THE PAGE until your teacher says that you may begin.

33. If $n + n + n = 60$, what is the value of n?

A. 6
B. 10
C. 15
D. 20
E. 30

34. Bill has b marbles. Rosa has r marbles. How many marbles do Bill and Rosa have together?

F. $b + r$

G. $b - r$

H. $r - b$

J. br

K. $\frac{b}{r}$

35. There were x boxes. Each box had s shoes in it. How many shoes are there in all?

A. $x + s$

B. $x - s$

C. $s - x$

D. xs

E. $\frac{x}{s}$

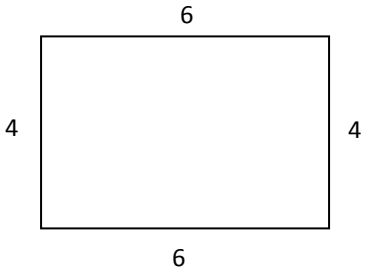
36. The perimeter of a square is 36 inches. What is the length of one side of the square?

F. 4 inches
G. 6 inches
H. 9 inches
J. 18 inches

37. What is the least whole number x for which $2x > 11$?

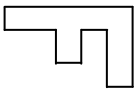
A. 5
B. 6
C. 9
D. 22
E. 23

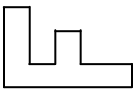
38. Which numerical expression gives the area of the rectangle at the right?

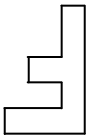


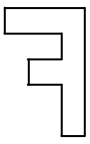
F. 4×6
G. $4 + 6$
H. $2(4 \times 6)$
J. $2(4 + 6)$
K. $4 + 6 + 4 + 6$

39. The figure to the right is shaded on the top side and white on the under side. If the figure were flipped over, its white side could look like which of the following figures?

A. 

B. 

C. 

D. 

40. Tetsu rides his bicycle x miles the first day, y miles the second day, and z miles the third day. Which of the following expressions represents the average number of miles per day that Tetsu travels?

F. $x + y + z$
G. xyz
H. $3(x + y + z)$
J. $3(xyz)$
K. $\dfrac{x + y + z}{3}$

41. Which expression describes the pattern in the first four rows of the table?

2	12
5	30
13	78
40	240
n	?

A. $n + 18$
B. $n + 10$
C. $6n$
D. $20n$
E. 360

42. A rectangle has length of 3.6 cm and width of 5 cm. Which numerical expression gives the perimeter of the rectangle?

F. $3.6 + 5$
G. $2(3.6 + 5)$
H. 3.6×5
J. $2(3.6 \times 5)$
K. $3.6 \times 5 \times 3.6 \times 5$

43. Suppose that a measurement of a rectangular box is given as 48 cubic inches. What could the measurement represent?

A. the distance around the top of the box
B. the length of an edge of the box
C. the surface area of the box
D. the volume of the box

44. Suppose that $3 \times (\square + 5) = 30$. The number in the box should be _____.

F. 2
G. 5
H. 10
J. 95

45. There are x students from a class on school teams. There are y students in the class. How many students are <u>not</u> on school teams?

A. $x + y$

B. $x - y$

C. $y - x$

D. xy

E. $\frac{x}{y}$

46. If m and n are not zero, which of the following is <u>not</u> necessarily true?

F. $m + n = n + m$

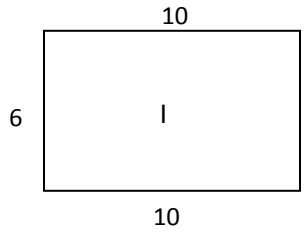
G. $m - n = n - m$

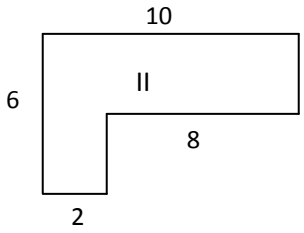
H. $mn = nm$

J. $\frac{m}{n} = \frac{2m}{2n}$

K. $2(m + n) = 2m + 2n$

47. Consider the two figures below. All of the angles are right angles. How do the perimeters of the two figures compare?





A. The perimeter of Figure I is larger than the perimeter of Figure II.
B. The perimeter of Figure II is larger than the perimeter of Figure I.
C. Both figures have the same perimeter.
D. There is not enough information given to find the perimeters of Figures I and II.

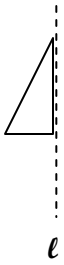
48. A plumber charges customers $48 for each hour worked plus an additional $9 for travel. If h represents the number of hours worked, which of the following expressions could be used to calculate the plumber's total charge in dollars?

F. $48 + 9 + h$
G. $48 \times 9 \times h$
H. $48 + (9 \times h)$
J. $(48 \times 9) + h$
K. $(48 \times h) + 9$

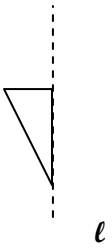
49. The dot • stands for multiplication. Suppose you can replace x by any number you wish. Which is <u>not</u> correct?

A. $x \bullet 1 = x$
B. $x + 0 = x$
C. $x \bullet 0 = 0$
D. $x + 1 = x$
E. $x - x = 0$

50. Consider the triangle and line shown at the right. Which of the following shows the result of flipping the triangle over the line l?

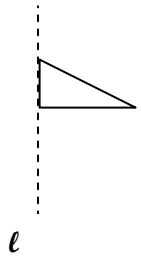


F.

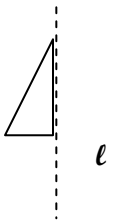


G.

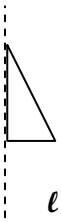
H.



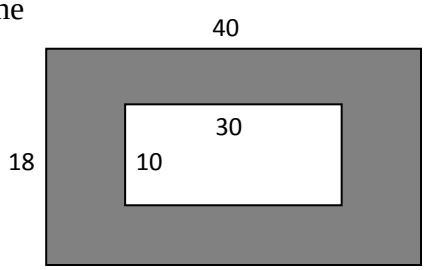
J.



K.

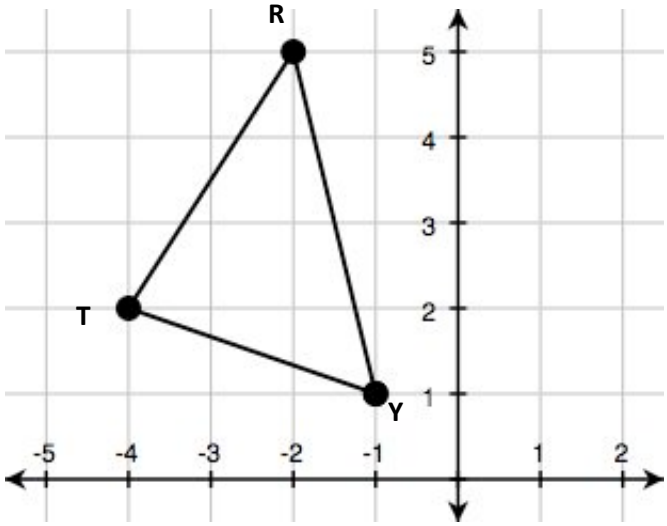


51. A rectangular pool has dimensions 10 meters by 30 meters. It is surrounded by a walkway as shown by the shading in the diagram at right. Which of the following gives the area of the walkway in square meters?



A. 40×18
B. 30×10
C. $(40 \times 18) - (30 \times 10)$
D. $(40 \times 18) + (30 \times 10)$
E. $(40 - 30) \times (18 - 10)$

52. Triangle TRY is translated 3 units to the right and 4 units up. What will be the coordinates of the image of point Y?



F. (3, 4)

G. (2, 5)

H. (4, 5)

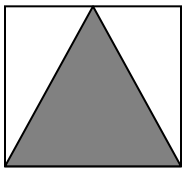
J. (-4, -3)

K. (4, 3)

53. Solve: $n - 3 = 2n + 19$.

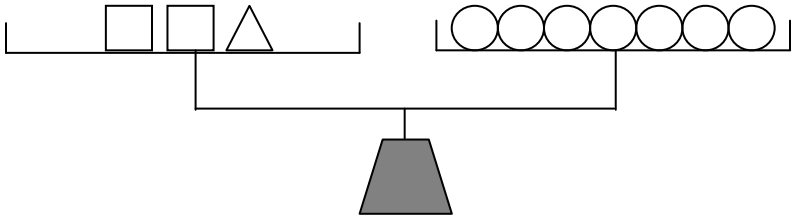
A. -57
B. -22
C. -16
D. 16
E. 22

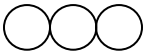
54. If the area of the shaded triangle shown at the right is 4 square inches, what is the area of the entire square?

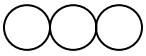


F. 4 square inches
G. 8 square inches
H. 12 square inches
J. 16 square inches
K. Not enough information given

55. The objects on the scale below make it balance exactly.



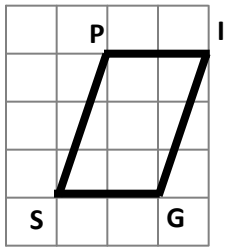
According to this scale, if  balances  , then  balances which of the following?

A. 
B. 
C. 
D. 

56. A small plastic cube has a volume of 64 cubic inches. It is going to be covered with soft fabric to make a baby toy. How much fabric will be needed to cover the cube if the fabric does not overlap?

F. 4 square inches
G. 16 square inches
H. 24 square inches
J. 96 square inches
K. 384 square inches

57. Each square on the grid at the right represents 1 square unit. Find the area of figure PIGS.



A. 3 square units
B. 6 square units
C. 7 square units
D. 10 square units
E. 12 square units

58. How many cubes 1 cm by 1 cm by 1 cm can be packed in a box measuring 2 cm by 5 cm by 6 cm?

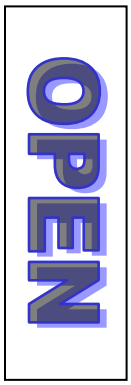
F. 13
G. 16
H. 60
J. 70
K. 120

59. Which expression fits all instances of the pattern at the right?

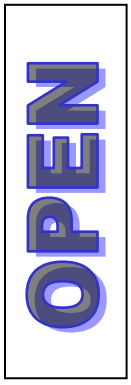
1	7
2	11
3	15
4	19
n	?

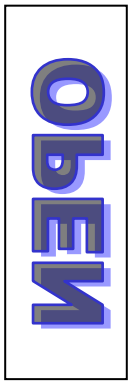
A. $n + 4$
B. $n + 6$
C. $3n + 4$
D. $4n$
E. $4n + 3$

60. The sign at the right is hanging in a store window. One of the hooks breaks. Which of the following shows the sign after a 90° rotation clockwise?

F. 

G. 

H. 

J. 

K. 

UCSMP

The University of Chicago School Mathematics Project

Test Number _____

Algebra/Geometry Readiness Test: Part One

Do not open this booklet until you are told to do so.

This test contains 40 questions. You have 40 minutes to take the test.

1. All questions are multiple-choice. Some questions have four choices and some have five. There is only one correct answer to each question.

2. Using the portion of the answer sheet marked **TEST 2**, fill in the circle • corresponding to your answer.

3. If you want to change an answer, completely erase the first answer on your answer sheet.

4. If you do not know the answer, you may guess.

5. Use the scrap paper provided to do any writing or drawing. **DO NOT MAKE ANY STRAY MARKS IN THE TEST BOOKLET OR ON THE ANSWER SHEET.**

6. You may **not** use a calculator.

DO NOT TURN THE PAGE until your teacher says that you may begin.

1. What is the least whole number x for which $2x > 11$?

   A. 5
   B. 6
   C. 9
   D. 22
   E. 23

2. Which of these fractions is smallest?

   F. $\frac{1}{6}$
   G. $\frac{2}{3}$
   H. $\frac{1}{3}$
   J. $\frac{1}{2}$

3. There were x boxes. Each box had s shoes in it. How many shoes are there in all?

   A. $x + s$
   B. $x - s$
   C. $s - x$
   D. xs
   E. $\frac{x}{s}$

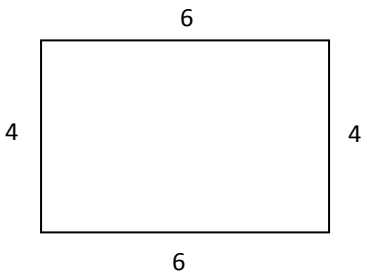
4. The perimeter of a square is 36 inches. What is the length of one side of the square?

   F. 4 inches
   G. 6 inches
   H. 9 inches
   J. 18 inches

5. Sound travels at approximately 330 meters per second. The sound of an explosion took 28 seconds to reach a person. Which of these is the closest estimate of how far away the person was from the explosion?

A. 12 000 m
B. 9000 m
C. 8000 m
D. 6000 m

6. Which numerical expression gives the area of the rectangle at the right?



F. 4×6
G. $4 + 6$
H. $2(4 \times 6)$
J. $2(4 + 6)$
K. $4 + 6 + 4 + 6$

7. If the price of a can of beans is raised from 50 cents to 60 cents, what is the percent increase in the price?

A. 83.3%
B. 20%
C. 18.2%
D. 16.7%
E. 10%

8. Tetsu rides his bicycle x miles the first day, y miles the second day, and z miles the third day. Which of the following expressions represents the average number of miles per day that Tetsu travels?

F. $x + y + z$
G. xyz
H. $3(x + y + z)$
J. $3(xyz)$
K. $\frac{x + y + z}{3}$

9. Which expression describes the pattern in the first four rows of the table?

A. $n + 18$
B. $n + 10$
C. $6n$
D. $20n$
E. 360

2	12
5	30
13	78
40	240
n	?

10. A rectangle has length of 3.6 cm and width of 5 cm. Which numerical expression gives the perimeter of the rectangle?

F. $3.6 + 5$
G. $2(3.6 + 5)$
H. 3.6×5
J. $2(3.6 \times 5)$
K. $3.6 \times 5 \times 3.6 \times 5$

11. Suppose that a measurement of a rectangular box is given as 48 cubic inches. What could the measurement represent?

A. the distance around the top of the box
B. the length of an edge of the box
C. the surface area of the box
D. the volume of the box

12. Suppose that $3 \times (\square + 5) = 30$. The number in the box should be _____.

F. 2
G. 5
H. 10
J. 95

13. There are x students from a class on school teams. There are y students in the class. How many students are <u>not</u> on school teams?

A. $x + y$

B. $x - y$

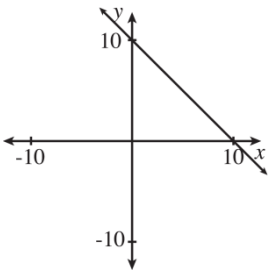
C. $y - x$

D. xy

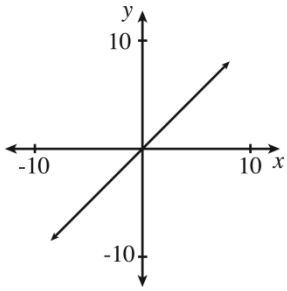
E. $\frac{x}{y}$

14. Which is the graph of the equation $x + y = 10$?

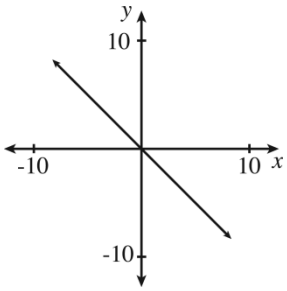
F.



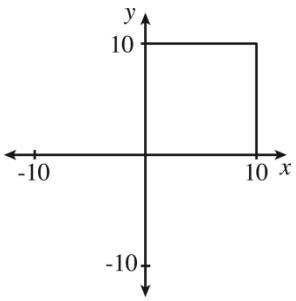
G.



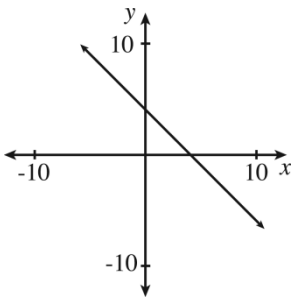
H.



J.



K.



15. Of the following, which is NOT true for all rectangles?

A. The opposite sides are parallel.
B. The opposite sides are equal.
C. All angles are right angles.
D. The diagonals are equal.
E. The diagonals are perpendicular.

16. If m and n are not zero, which of the following is <u>not</u> necessarily true?

F. $m + n = n + m$

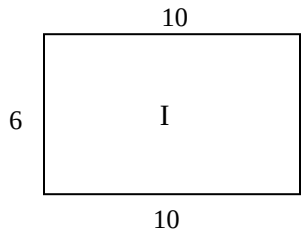
G. $m - n = n - m$

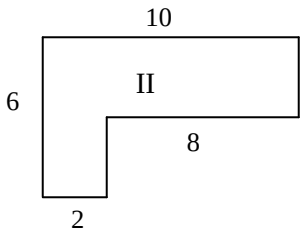
H. $mn = nm$

J. $\frac{m}{n} = \frac{2m}{2n}$

K. $2(m + n) = 2m + 2n$

17. Consider the two figures below. All of the angles are right angles. How do the perimeters of the two figures compare?





A. The perimeter of Figure I is larger than the perimeter of Figure II.
B. The perimeter of Figure II is larger than the perimeter of Figure I.
C. Both figures have the same perimeter.
D. There is not enough information given to find the perimeters of Figures I and II.

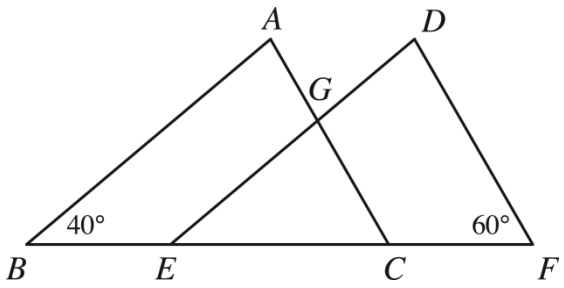
18. A plumber charges customers $48 for each hour worked plus an additional $9 for travel. If h represents the number of hours worked, which of the following expressions could be used to calculate the plumber's total charge in dollars?

F. $48 + 9 + h$
G. $48 \times 9 \times h$
H. $48 + (9 \times h)$
J. $(48 \times 9) + h$
K. $(48 \times h) + 9$

19. One of the acute angles in a right triangle measures 28 degrees. What is the measure, in degrees, of the other acute angle?

A. 17°
B. 28°
C. 62°
D. 90°
E. 152°

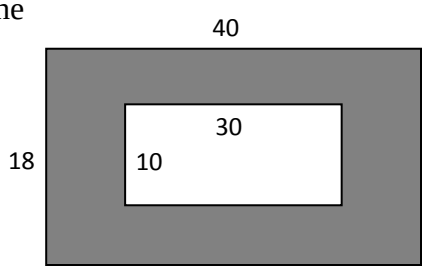
20. In this figure, triangles *ABC* and *DEF* are congruent with *BC* = *EF*.



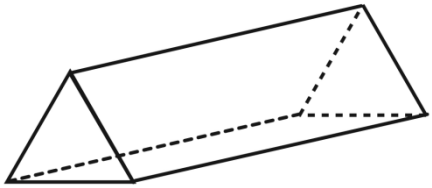
What is the measure of angle *EGC*?

F. 20°
G. 40°
H. 60°
J. 80°
K. 100°

21. A rectangular pool has dimensions 10 meters by 30 meters. It is surrounded by a walkway as shown by the shading in the diagram at right. Which of the following gives the area of the walkway in square meters?

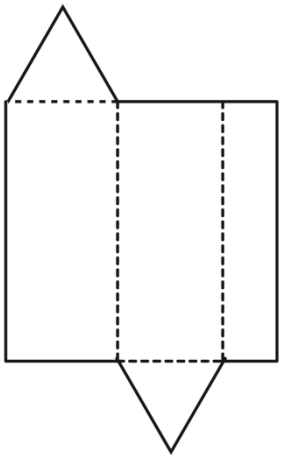


A. 40 × 18
B. 30 × 10
C. (40 × 18) – (30 × 10)
D. (40 × 18) + (30 × 10)
E. (40 – 30) × (18 – 10)

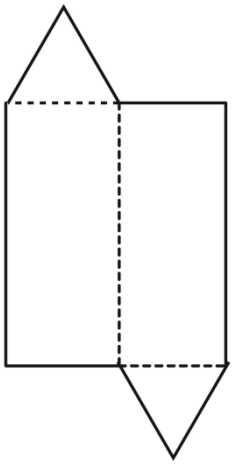


22. Which of the following can be folded to form the prism above?

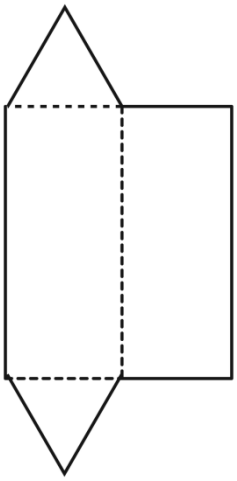
F.



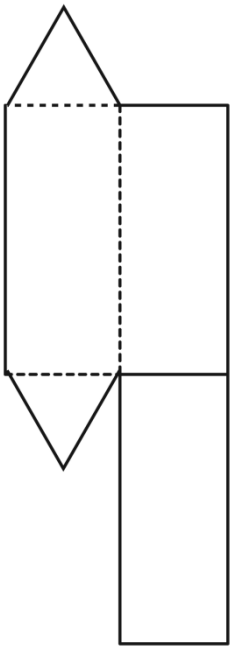
G.



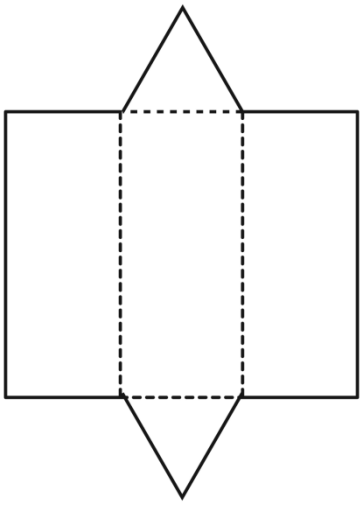
H.



J.



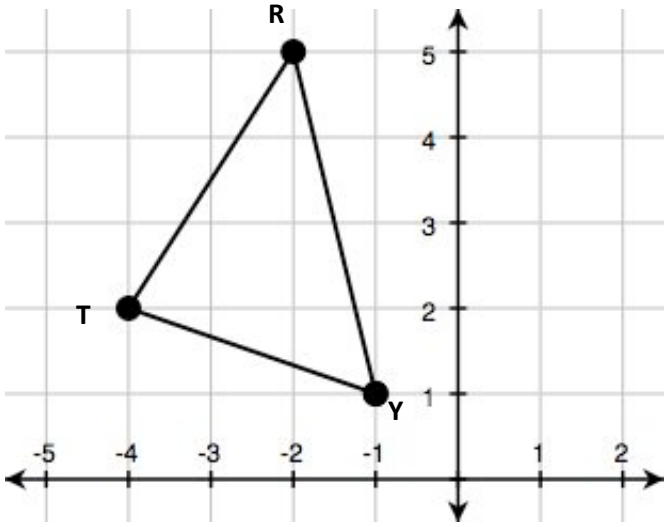
K.



23. The dot • stands for multiplication. Suppose you can replace x by any number you wish. Which is <u>not</u> correct?

A. $x \cdot 1 = x$
B. $x + 0 = x$
C. $x \cdot 0 = 0$
D. $x + 1 = x$
E. $x - x = 0$

24. Triangle *TRY* is translated 3 units to the right and 4 units up. What will be the coordinates of the image of point *Y*?

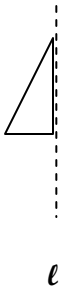


F. (3, 4)
G. (2, 5)
H. (4, 5)
J. (-4, -3)
K. (4, 3)

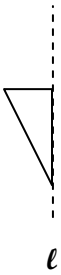
25. Solve: $n - 3 = 2n + 19$.

A. -57
B. -22
C. -16
D. 16
E. 22

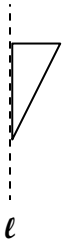
26. Consider the triangle and line shown at the right. Which of the following shows the result of flipping the triangle over the line l?



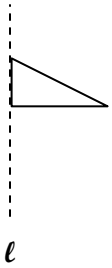
F.



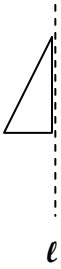
G.



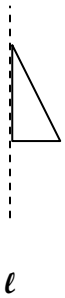
H.



J.



K.



27. What is the value of $\frac{4}{5} - \frac{1}{3} - \frac{1}{15}$?

A. $\frac{1}{5}$

B. $\frac{2}{5}$

C. $\frac{7}{15}$

D. $\frac{3}{4}$

E. $\frac{4}{5}$

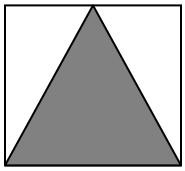
28. In a quadrilateral, each of two angles has a measure of 115°. If the measure of a third angle is 70°, what is the measure of the remaining angle?

F. 60°
G. 70°
H. 130°
J. 140°
K. None of the above.

29. Of the following, which is the closest approximation to a 15 percent tip on a restaurant check of $24.99?

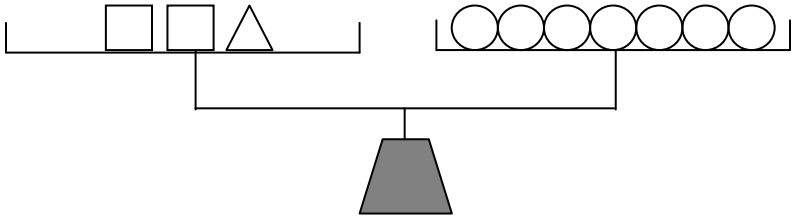
A. $2.50
B. $3.00
C. $3.75
D. $4.50
E. $5.00

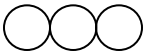
30. If the area of the shaded triangle shown at the right is 4 square inches, what is the area of the entire square?

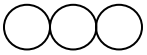


F. 4 square inches
G. 8 square inches
H. 12 square inches
J. 16 square inches
K. Not enough information given

31. The objects on the scale below make it balance exactly.



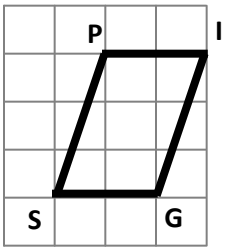
According to this scale, if  balances  , then  balances which of the following?

A. 
B. 
C. 
D. 

32. A small plastic cube has a volume of 64 cubic inches. It is going to be covered with soft fabric to make a baby toy. How much fabric, in square inches, will be needed to cover the cube if the fabric does not overlap?

F. 4
G. 16
H. 24
J. 96
K. 384

33. Each square on the grid at the right represents 1 square unit. Find the area of figure *PIGS* in square units.



A. 3
B. 6
C. 7
D. 10
E. 12

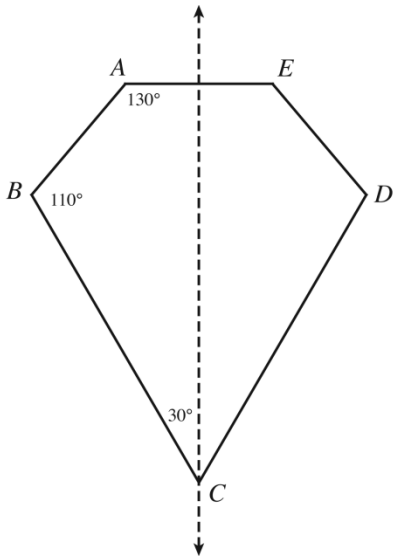
34. How many cubes 1 cm by 1 cm by 1 cm can be packed in a box measuring 2 cm by 5 cm by 6 cm?

F. 13
G. 16
H. 60
J. 70
K. 120

35. The total weight of a pile of 500 salt crystals is 6.5 g. What is the average weight of a salt crystal?

A. 0.0078 g
B. 0.013 g
C. 0.0325 g
D. 0.078 g

36. The line m is a line of symmetry for figure *ABCDE*.



The measure of angle *BCD* is

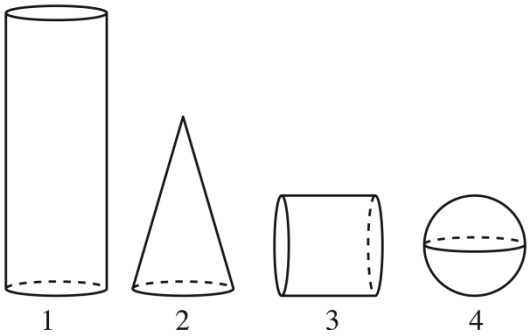
F. 30°
G. 50°
H. 60°
J. 70°
K. 110°

37. Which expression fits all instances of the pattern below?

A. $n + 4$
B. $n + 6$
C. $3n + 4$
D. $4n$
E. $4n + 3$

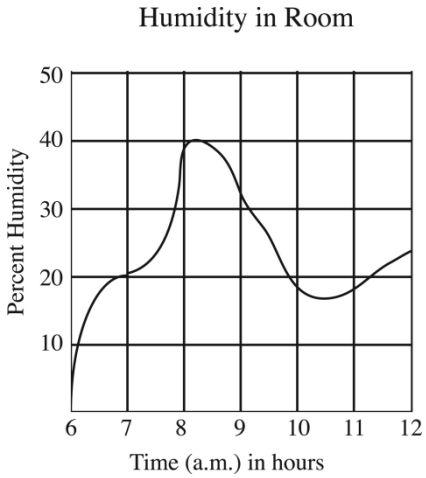
1	7
2	11
3	15
4	19
n	?

38. Which of these shapes are cylinders?



F. 1 and 2
G. 1 and 3
H. 2 and 4
J. 3 and 4

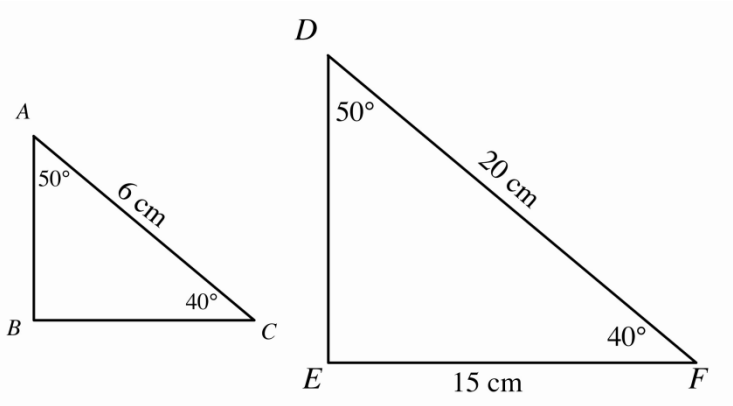
39. The graph below shows the humidity in a room as recorded on a certain morning.



On the morning shown in the graph, how many times between 6 a.m. and 12 noon was the humidity exactly 20 percent?

A. One
B. Two
C. Three
D. Four

40. The figure represents two similar triangles. The triangles are not drawn to scale.



In the actual triangle *ABC*, what is the length of side *BC*?

F. 3.5 cm
G. 4.5 cm
H. 5 cm
J. 5.5 cm
K. 8 cm

UCSMP

The University of Chicago School Mathematics Project

Test Number _____

Algebra/Geometry Readiness Test: Part Two

Name (Print) _____

School _____

Teacher_____

Period _____

Do you have a calculator available for use on this test? _____ Yes _____ No

If yes, what model calculator is it? _____

Which is true of your calculator?

_____ It does not graph equations.

_____ It can graph equations.

Do not open this booklet until you are told to do so.

1. This test contains 12 questions.
2. You may use a calculator on this test.
3. There may be many ways to answer a question. We are interested in how you solve a problem. So, be sure to show all your work on the pages in the test booklet. If you use a calculator to solve a problem, be sure to explain what features or keys you used.
4. Try to do your best on each problem.
5. You have 35 minutes to answer the questions.

1. Write 0.48 as a fraction reduced to its lowest terms.

Answer: _____

2. Write a decimal between 3 and 3.1.

Answer: _____

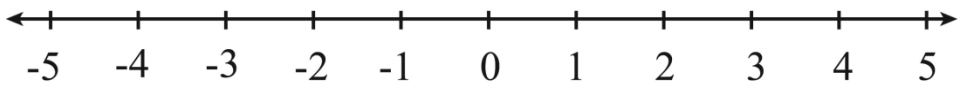
3. Laura has $240. She spent $\frac{5}{8}$ of it. How much money did she have left?

Answer: _____

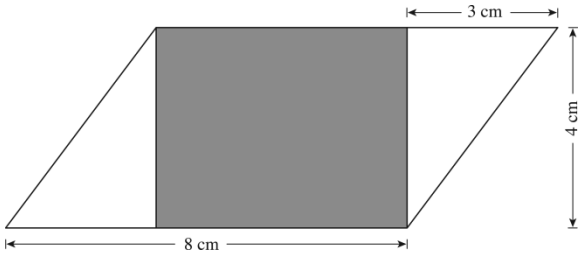
4. Find the value of x if $12x - 10 = 6x + 32$.

Answer: _____

5. Solve $x + 1 > -2$ and graph your solution on the number line below.



6. The figure shows a shaded rectangle inside a parallelogram.

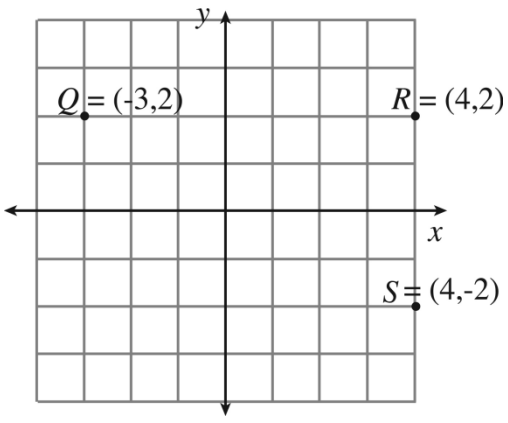


What is the area of the shaded rectangle?

Answer: _____

7. The points *Q*, *R*, and *S* shown in the graph below are three vertices of rectangle *QRST*.

a. Plot and label point *T* so that *QRST* is a rectangle.



b. Give the coordinates of point *T*. _____

8. A book publisher sent 140 copies of a certain book to a bookstore. The publisher packed the books in two types of boxes. One type of box held 8 copies of the book, and the other type held 12 copies of the book. The boxes were all full, and there were equal numbers of both types of boxes.

   a. How many boxes holding 12 books were sent to the publisher?

      Answer: _____

   b. What fraction of the books sent to the bookstore were packed in the smaller boxes?

      Answer: _____

9. Ken bought a used car for $5,375. He had to pay an additional 15 percent of the purchase price to cover both sales tax and extra fees. What is the <u>total</u> amount Ken paid?

   Show your work.

   Answer: _____

10. A club has 86 members, and there are 14 more girls than boys. How many boys and how many girls are members of the club?

Show your work.

Answer: _____

11. a. For all real numbers, m, x and y, is it true that $m(x + y) = mx + y$?

_____ Yes _____ No

b. Imagine that someone does not know the answer to part **a**. Explain how you would convince that person that your answer to part **a** is correct.

12. The figures show four sets consisting of circles.

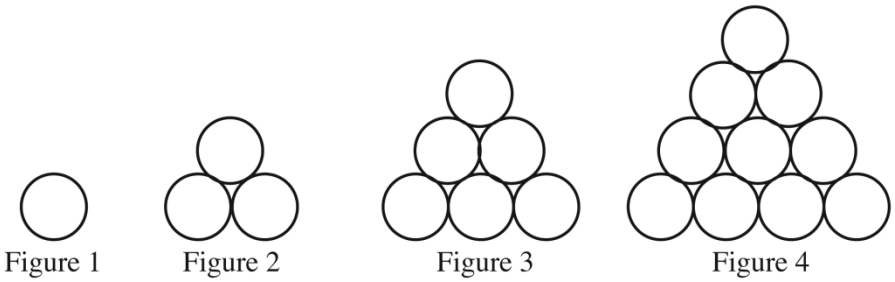


Figure 1 Figure 2 Figure 3 Figure 4

a. Complete the table below. First, fill in how many circles make up Figure 4. Then, find the number of circles that would be needed for the 5th figure if the sequence of figures is extended.

Figure	**Number of circles**
1	1
2	3
3	6
4	
5	

b. The sequence of figures is extended to the 7th figure. How many circles would be needed for Figure 7?

Answer: _____

c. The 50th figure in the sequence contains 1275 circles. Determine the number of circles in the 51st figure. Without drawing the 51st figure, explain or show how you arrived at your answer.

UCSMP

The University of Chicago School Mathematics Project

Middle School Mathematics: Student Information Form

During this year, your class has been part of a study of mathematics materials. You have taken some tests throughout the year to show what you have learned in math from the materials you have been using.

You are invited to answer the following 15 questions. Your answers to these questions will help us understand how you used the materials and class activities this year. Although you are not required to answer these questions, your responses can help improve mathematics materials for future students.

After you respond to the following questions, please put this form in the envelope provided and seal the envelope before returning to your teacher.

A. Were you in this class at the beginning of the school year? _____ Yes _____ No

B. Were you in this class when you received your first report card this school year?
____ Yes ____ No

School _____ Teacher_____

Period _____

1. About how much time did you spend, on the average, this year on your mathematics homework?

_____ 0-15 minutes per day
_____ 16-30 minutes per day
_____ 31-45 minutes per day
_____ 46-60 minutes per day
_____ more than 60 minutes per day

2. How often did your teacher expect you to read your mathematics textbook?

_____ almost every day
_____ 2-3 times per week
_____ 2-3 times a month
_____ less than once a month
_____ almost never

3. How often did you actually read your mathematics textbook?

_____ almost every day
_____ 2-3 times per week
_____ 2-3 times a month
_____ less than once a month
_____ never

4. How often did these things happen?

		Daily	Frequently	Seldom	Never
a.	Teacher read aloud in class.	_____	_____	_____	_____
b.	Students read aloud in class.	_____	_____	_____	_____
c.	Students read silently in class.	_____	_____	_____	_____
d.	Students discussed the reading in class.	_____	_____	_____	_____

5. How important do you think it is to read your mathematics text if you want to understand mathematics?

_____ very important
_____ somewhat important
_____ not very important

6. How often did you do these things when solving problems?

		Daily	Frequently	Seldom	Never
a.	write answers only	_____	_____	_____	_____
b.	write a few steps in your solutions	_____	_____	_____	_____
c.	write complete solutions	_____	_____	_____	_____
d.	explain or justify your work	_____	_____	_____	_____
e.	write in journals	_____	_____	_____	_____
f.	do a project	_____	_____	_____	_____

7. How important do you think it is to write about mathematics to show you understand mathematics?

_____ very important
_____ somewhat important
_____ not very important

8. Did you have a calculator available for use this year **in your mathematics class**?

_____ Yes (*Go to question 8a*.)

_____ No (*Go to question 12*.)

a. If yes, what model calculator did you have for use **in your mathematics class**?

_____

b. Which is true of your calculator?

_____ It does not graph equations.

_____ It can graph equations.

9. About how often did you use this calculator **in your mathematics class**?

_____ almost every day

_____ 2-3 times per week

_____ 2-3 times a month

_____ less than once a month

_____ never

10. For what did you use this calculator **in your mathematics class**? (Check all that apply.)

_____ checking answers
_____ doing computations
_____ solving problems
_____ graphing equations
_____ working with a spreadsheet
_____ making tables
_____ analyzing data
_____ finding equations to model data

_____ other (specify) _____

11. How helpful was the use of this calculator in learning mathematics **in your mathematics class**?

_____ very helpful
_____ somewhat helpful
_____ not very helpful

12. Did you have a calculator available for use this year **for homework**?

_____ Yes (*Go to question 12a*.)

_____ No (*Stop and return this form to your teacher*.)

a. If yes, which type of calculator did you have for use **for homework**?

_____ The same calculator I had for use in my mathematics class.

_____ A different calculator than I had for use in my mathematics class.

b. If you had a different calculator for use with homework than you had in class, please list the model. _____

c. Which is true of this calculator that you used for homework?

_____ It does not graph equations.

_____ It can graph equations.

13. About how often did you use a calculator **for homework**?

_____ almost every day

_____ 2-3 times per week

_____ 2-3 times a month

_____ less than once a month

_____ never

14. How did you use a calculator **for homework**? (Check all that apply.)

_____ checking answers
_____ doing computations
_____ solving problems
_____ graphing equations
_____ other (specify) _____
_____ working with a spreadsheet
_____ making tables
_____ analyzing data
_____ finding equations to model data

15. How helpful was the use of calculator in learning mathematics **during homework**?

_____ very helpful

_____ somewhat helpful

_____ not very helpful

Appendix E

Rubrics for Scoring Constructed Response Items

Rubrics for *Algebra/Geometry Readiness Test: Part Two*

Item 1. Write 0.48 as a fraction reduced to lowest terms. (TIMSS 1999)

Score: 1 point if correct, 0 otherwise

Code	
60 (Correct)	$\mathbf{\frac{12}{25}}$
70	$\frac{48}{100}, \frac{24}{50}$
71	Any fraction other than $\frac{48}{100}$ with 48 as numerator
72	Any fraction with 48 as denominator
73	$\frac{4}{8}, \frac{2}{4}, \frac{1}{2}$
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
80	$\frac{6}{12.5}$
99	Blank, non-response

Item 2. Write a decimal between 3 and 3.1. (*Transition Mathematics,* Second Edition study)

Score: 1 point if correct, 0 otherwise

Code	
60 (Correct)	**Decimal between 3 and 3.1**
70	3.0
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
99	Blank, non-response

Item 3. Laura has $240. She spent $\frac{5}{8}$ of it. How much money did she have left? (TIMSS 1999)

Score: 1 point if correct, 0 otherwise

Code	
60 (Correct)	**90**
70	150 [money spent]
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
99	Blank, non-response

Item 4. Find the value of x if $12x - 10 = 6x + 32$. (TIMSS 1999)

Score: 1 point if correct, 0 otherwise

Code	
60 (Correct)	**7**
70	$3\frac{2}{3}$ or $2\frac{1}{3}$ or $1\frac{2}{9}$, uses incorrect operation [$32 - 10 = 22$, $12x + 6x = 18x$, or both]
71	Any expression or equation, other than $x = 7$, containing x
79	Other incorrect (including crosses out/erased, stray marks, illegible, or off task)
99	Blank, non-response

Item 5. Solve $x + 1 > -2$ and graph your solution on the number line below.

Score: 2 points if correct

Code	
60 (Correct)	**Solve and write a symbolic solution [$x > -3$] and graph correctly with an open circle for the endpoint**
61 (Correct)	**Solve correctly but only show the solution on the graph with an open circle for the endpoint**
Partial Response (1 point)	
11	Solve correctly, but no graph
12	Solve correctly but graphed the solution with a closed circle for the endpoint
13	Solve correctly but graph incorrectly [other than a closed circle] but as an inequality
14	Solve correctly but graph a discrete set of points
15	Solve incorrectly but graph the solution with an open circle
16	Solve incorrectly but graph the solution with a closed circle
17	Solve incorrectly, but graph at –3 with open or closed circle
Incorrect Response (0 points)	
70	Graph $x > -2$ with an open or closed circle
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
99	Blank, non-response

Item 6. The figure shows a shaded rectangle inside a parallelogram. What is the area of the shaded rectangle? (TIMSS 1999)

Score: 1 point if correct, 0 otherwise

Code	
60 (Correct)	**20**
70	32 [4 * 8]
71	18 [found perimeter]
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
99	Blank, non-response

Item 7. The points *Q*, *R*, and *S* shown in the graph below are three vertices of rectangle *QRST*. (modified from NAEP)

7a. Plot and label point *T* so that *QRST* is a rectangle.

Score: 1 point if correct, 0 otherwise

Code	
60 (Correct)	**Label *T* at (–3, –2)**
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
99	Blank, non-response

7b. Give the coordinates of point *T*.

Score: 1 point if correct, 0 otherwise

Code	
60 (Correct)	**(–3, –2)**
70	(–4, –2)
71	(3, –2)
72	(–3, 2)
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
99	Blank, non-response

Item 8. A book publisher sent 140 copies of a certain book to a bookstore. The publisher packed the books in two types of boxes. One type of box held 8 copies of the book, and the other type held 12 copies of the book. The boxes were all full, and there were equal numbers of both types of boxes. (TIMSS 1999)

8a. How many boxes holding 12 books were sent to the publisher? (Note: The word *publisher* should have been *bookstore*.)

Score: 1 point if correct, 0 otherwise

Code	
60 (Correct)	**7**
62* (Correct)	**Identified typo [Student noted that no books were sent to the publisher.]**
74	70
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
99	Blank, non-response

* This code was added to the TIMSS codes because of the indicated typo. Only 2 of 455 responses made reference to the typo.

8b. What fraction of the books sent to the bookstore were packed in the smaller boxes?

Score: 1 point if correct, 0 otherwise

Code	
60 (Correct)	**$\frac{2}{5}$, another fraction or percent equivalent to $\frac{2}{5}$ (e.g., $\frac{8}{20}, \frac{14}{35}, \frac{28}{70}$, etc.), other correct**
70	$\frac{1}{2}$
71	$\frac{2}{3}$ or $\frac{8}{12}$ or $\frac{56}{84}$ [fraction of boxes]
72	Any integer
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
99	Blank, non-response

Item 9. Ken bought a used car for $5,735. He had to pay an additional 15 percent of the purchase price to cover both sales tax and extra fees. What is the <u>total</u> amount Ken paid? (modified from NAEP)

Score: 2 points if correct

Code	
60 (Correct)	**6181.25 [5373 * 0.15 + 5735 = 6181.25]**
Partial Response (1 point)	
10	806.25 (only found tax)
11	Clerical error, adding or subtracting
12	Tax correct and another error
Incorrect Response (0 points)	
70	Added 15 or 0.15 to 5375
71	Divided by 0.15
72	Error with amount (5375) (decimal)
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
99	Blank, non-response

Item 10. A club has 86 members, and there are 14 more girls than boys. How many boys and how many girls are members of the club? (TIMSS 1999)

Score: 2 points in total, 1 point for partial response, and 0 for incorrect response

Code	
60 (Correct)	**36 boys and 50 girls [Numerical method: 86 ÷ 2 = 43; 43 – 7 = 36 boys, 43 + 7 = 50 girls]**
61	**36 boys and 50 girls [Algebraic method: $b + (b + 14) = 86$; $2b = 72$; $b = 36$; $g = 36 + 14 = 50$]**
62	**Other fully satisfactory method including "guess and check" with justification that 36 + 50 = 86**
Partial Response (1 point)	
10	Either 36 boys or 50 girls, with or without another (incorrect) number
11	36 and 50 are given. [Makes correct computations but reverses labels or does not include mention of which is boys or girls]
12	36 boys and 50 girls, no method shown
13	Gives an algebraic equation or system of equations that can lead to the correct solution
19	Other partially correct
Incorrect Response (0 points)	
70	29 boys and 57 girls [Computes 86 ÷2 = 43, 43 – 14 = 29 and 43 + 14 = 57]
71	One of the numbers is 72 [Computes 86 - 14]
72	29 boys and 43 girls [Computes 43 – 14 = 29]
73	Gives an algebraic equation or system of equations that cannot lead to correct solution
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
99	Blank, non-response

Item 11a. For all real numbers, m, x, and y, is it true that $m(x + y) = mx + y$? (*Transition Mathematics*, Second Edition)

Score: 1 point if correct, 0 otherwise

Code	
60 (Correct)	**No**
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
99	Blank, non-response

11b. Imagine that someone does not know the answer to part a. Explain how you would convince that person that your answer to part a is correct.

Score: 2 points in total, 1 point for partial response, and 0 for incorrect response

Code	
60 (Correct)	**Explanation with counterexample and worked out to show that the two sides are not the same**
61	**Explanation with a graph used to show that the two sides are not the same**
62	**Explanation to suggest that a calculator was used to show the two sides are not the same**
Partial Response (1 point)	
10	Explanation to indicate the beginning of use of a counterexample but arithmetic mistake made (i.e., one side evaluated correctly and one side not)
11	Explanation to indicate the beginning of use of a counterexample but student does not work out both sides
12	Explanation to indicate the beginning of use of a counterexample but applies distributive property rather than evaluating expression as written
13	Student correctly applies distributive property but does not actually apply it to the problem (no equation)
14	Student references the distributive property but does not actually apply it to the problem (no equation)
15	Other partially correct
16	$m = 1$ or 0
Incorrect Response (0 points)	
70	Student attempts to use a counterexample but makes major conceptual errors
72	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
79	Mathematically meaningless
99	Blank, non-response

Item 12. The figures show four sets consisting of circles. (TIMSS 1999)

12a: Complete the table below. First, fill in how many circles make up Figure 4. Then, find the number of circles that would be needed for the 5th figure if the sequence of figures is extended.

Score: 1 point if correct, 0 otherwise

Code	
60 (Correct)	**10 and 15**
70	10 and any number other than 15
71	10 and no numerical response for 5th figure
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
99	Blank, non-response

12b. The sequence of figures is extended to the 7th figure. How many circles would be needed for Figure 7?

Score: 1 point if correct, 0 otherwise

Code	
60 (Correct)	**28**
70	21
71	22
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)
99	Blank, non-response

12c. The 50th figure in the sequence contains 1275 circles. Determine the number of circles in the 51st figure. Without drawing the 51st figure, explain or show how you arrived at your answer.

Score: 2 points in total, 1 point for partial response, and 0 for incorrect response

Code	
60 (Correct)	**1326. Correct general expression $\frac{n(n+1)}{2}, \frac{51(52)}{2}$, or equivalent**
61	**1326 [adds 1275 + 51]**
62	**Other fully correct, including [(figure number)^2 – number of circles in previous figure]**
Partial Response (1 point)	
10	1326 without showing how obtained
11	Correct method but does not write 1326 as answer
19	Other partially correct
Incorrect Response (0 points)	
79	Mathematically meaningless
99	Blank, non-response

Appendix F

Student Results for School 07, Class 024

Student Achievement for School 07, Class 024

Teacher: T2107U1 (See Chapter 5)

Number of Students: $n = 23$

Pretest Scores

TerraNova CAT Survey, Form 17: mean = 23.13, s.d. = 3.88 (max score = 32)

Middle School Mathematics Test: mean = 18.26, s.d. = 3.37 (max score = 28)

Posttest Scores: *Iowa Algebra Aptitude Test*

Total Test: mean = 43.1, s.d. = 10.64 (max score = 63)

Part A: mean = 12.1, s.d. = 2.95 (max score = 18)

Part B: mean = 9.9, s.d. = 2.93 (max score = 15)

Part C: mean = 11.6, s.d. = 2.91 (max score = 15)

Part D: mean = 9.6, s.d. = 3.53 (max score = 15)

Fair Test: mean percent = 68.9%, s.d. = 17.4%
(57 items: A1-A7, A13-A18, B1-B15, C1-C15, D1-D10, D12-D15)

Posttest Scores: *Algebra/Geometry Readiness Test: Part One*

Total Test: mean = 24.1, s.d. = 5.82 (mean percent = 60.2%, s.d. = 14.5%, max score = 40)

Mean Percent Correct on Dimensions of Understanding:

Skills:	55.6% (s.d. = 20.1%)
Properties:	69.6% (s.d. = 19.9%)
Uses:	54.8% (s.d. = 21.7%)
Representations:	62.9% (s.d. = 18.9%)

Mean Percent Correct on the Fair Test (items all 40 items): mean = 60.2%, s.d. = 14.5%

Mean Percent Correct on Items Common to the *Middle School Mathematics Test* and the *Algebra/Geometry Readiness Test: Part One*
mean on pretest = 61.4%, s.d. = 13.4%
mean on posttest = 65.2%, s.d. = 16.3%

Percent Correct by Posttest Item (Pretest Percent)

variables and their uses:	item 3:	91 (83)	item 8:	70 (43)
	item 13:	61 (65)	item 18:	70 (74)
	item 9:	96 (78)	item 37:	65 (48)

equations and inequalities:	item 12:	96 (96)	item 25:	22 (39)
	item 31:	78 (87)	item 1:	70 (70)
	item 16:	35 (43)	item 23:	83 (83)
	item 14:	48	item 39:	48
measurement:	item 4:	61 (91)	item 10:	65 (57)
	item 17:	35 (35)	item 6:	65 (48)
	item 21:	78 (52)	item 30:	61 (39)
	item 33:	74 (78)	item 11:	43 (52)
	item 32:	48 (22)	item 34:	57 (52)
transformations and geometry:	item 26:	83 (87)	item 24:	61 (52)
	item 36:	61		
geometric figures and properties:	item 15:	43	item 28:	26
	item 40:	26	item 20:	39
	item 19:	52	item 22:	91
	item 38:	96		
arithmetic:	item 2:	96	item 27:	52
	item 35:	30	item 5:	70
	item 7:	26	item 29:	39

Posttest Scores: *Algebra/Geometry Readiness Test: Part Two*

Total Test: mean = 10.8, s.d. = 4.6 (max score = 22)

Percent Correct by Posttest Item (Pretest Percent)

variables and their uses:	item 12a:	83	item 12b:	78
	item 12c:	S – 22; P – 0		
equations and inequalities:	item 4:	43	item 10:	S – 26; P – 8
	item 5:	S – 26; P – 4		
	item 11a:	91	item 11b:	S – 13; P – 17
measurement:	item 6:	65		
geometric figures and properties:	item 7a:	74	item 7b:	70
arithmetic:	item 3:	48	item 1:	70
	item 2:	74		

Instructional Issues (*n* = 25 who completed Student Information Form)

Percent of Students Reporting Various Reading and Writing Practices

How often did your teacher expect you to read your mathematics textbook?
everyday: 88%; 2-3 times/week: 12%

How often did you actually read your textbook?
everyday: 20%; 2-3 times/week: 36%; 2-3 times/month: 8%; less than once/month: 4%; almost never: 32%

How important do you think it is to read your mathematics text if you want to understand mathematics?
very: 60%; somewhat: 28%; not very: 12%

How important do you think it is to write about mathematics to show you understand mathematics?
very: 40%; somewhat: 48%; not very: 12%

Percent of Students Reporting on Reading Practices and Their Frequency

Teacher reads aloud in class.
daily: 55%; frequently: 40%

Students read aloud in class.
daily: 4%; frequently: 36%; seldom: 60%

Students read silently in class.
daily: 4%; frequently: 44%; seldom: 52%

Students discussed the reading in class:
daily: 44%; frequently: 36%; seldom: 8%; never: 12%

Percent of Students Reporting on Writing Practices and Their Frequency

Students wrote answers only.
daily: 76%; frequently: 12%; seldom: 4%; never: 8%

Students wrote a few steps in solutions.
daily: 12%; frequently: 44%; seldom: 32%; never: 12%

Students wrote complete solutions.
daily: 36%; frequently: 36%; seldom: 24%; never: 4%

Students explained or justified work.
daily: 12%; frequently: 24%; seldom: 32%; never: 32%

Students wrote in journals.
daily: 4%; frequently: 0%; seldom: 8%; never: 88%

Students did a project.
daily: 4%; frequently: 4%; seldom: 76%; never: 12%

Percent of Students Reporting Frequency and Helpfulness of Calculator Technology

About how often did you use this calculator in your mathematics class?

everyday: 28%; 2-3 times/week: 32%; 2-3 times/month: 36%; less than once/month: 4%

About how often did you use a calculator for homework?

everyday: 64%; 2-3 times/week: 20%; 2-3 times/month: 8%; less than once/month: 4%

How helpful was the use of this calculator in learning mathematics in your mathematics class?

very: 76%; somewhat: 20%; not very: 4%

How helpful was the use of this calculator in learning mathematics during homework?

very: 68%; somewhat: 28%

Percent of Students Reporting Use of Calculators for Various Purposes in Class and on Homework

For what did you use this calculator in your mathematics class?

checking answers: 100
doing computations: 64
solving problems: 92
graphing equations: 68
working with a spreadsheet: 52
making tables: 56
analyzing data: 64
finding equations to model data: 40

For what did you use this calculator for homework?

checking answers: 88
doing computations: 56
solving problems: 92
graphing equations: 40
working with a spreadsheet: 24
making tables: 24
analyzing data: 36
finding equations to model data: 20

Appendix G

Transition Mathematics (Third Edition, Field-Trial Version) Chapter Evaluation Summaries

Transition Mathematics (Third Edition): Chapter 1 Evaluation Summary

Lesson	No. Teachers	Mean No. Days (s.d.)	Mean Lesson Rating (s.d.)	Mean Question Rating (s.d.)	Questions Assigned[a]
1-1	7	1.0 (0.0)	4.43 (0.53)	4.29 (0.49)	1-16
Activity 1-1[b]	4	0.9 (0.5)	4.67 (0.58)	4.67 (0.58)	na
1-2	7	1.1 (0.4)	4.57 (0.53)	4.43 (0.53)	1-21
1-3	7	1.3 (0.4)	3.86 (0.90)	4.00 (0.58)	1-14, 16-27
1-4	7	1.4 (0.5)	4.29 (0.95)	4.14 (1.07)	1-20, 22, 24, 26-32, 34, 36, 38
1-5	7	1.1 (0.4)	4.71 (0.76)	4.57 (0.53)	1-22, 24-28
1-6	7	1.4 (0.5)	3.86 (1.07)	4.14 (1.07)	1-22, 24-32, 34
1-7	7	1.3 (0.5)	4.71 (0.76)	4.43 (0.53)	1-22, 24-30
1-8	7	1.4 (0.5)	4.57 (0.79)	4.57 (0.53)	1-30
1-9[c]	6	1.3 (0.4)	4.17 (0.75)	4.20 (0.84)	3-5, 9, 13, 14
Self-Test	7	0.9 (0.2)		4.67[d] (0.52)	1-34
SPUR	7	1.9 (0.5)		4.83[e] (0.41)	1-72
Overall		16.2 (3.3)	4.00 (0.65)		

[a] Reflects the questions assigned by at least two-thirds of the teachers who taught the lesson.

[b] Taught by teachers T2107U1, T2106U2, T2105U1, and T2104U1. Only Teachers T2106U2 and T2105U1 assigned problems and both assigned 1-9.

[c] Not done by Teacher T2103U1.

[d] Rating based on responses only from Teachers T2107U1, T2106U1, T2106U2, T2105U1, and T2102U1.

[e] Rating based on responses from all teachers except Teacher T2103U1.

Teacher[a]	Percent of Lessons Covered[b]	Percent of Questions Assigned[c]	Percent of Questions Assigned Based Only on Lessons Taught
T2107U1	100	97	98
T2103U1	89	70	75
T2106U1	100	88	88
T2106U2	100	100	100
T2105U1	100	77	77
T2102U1	100	63	65
T2104U1	100	97	97

[a] Teachers T2106U1 and T2106U2 are at the same school.

[b] Includes lessons, not counting Activities, Self-Test, or SPUR. Percent is based on a total of *n* = 9 lessons.

[c] Based on the total number of questions in all lessons, not including Exploration questions, questions in Activities, or questions in Self-Test or SPUR. (*n* = 256)

Comments on the sequence, level of difficulty, or other specific aspects of the content of this chapter.

- Didn't understand order of operations between powers of ten and scientific notation. (Teacher T2103U1)
- Good sequence, fairly difficult, but should be review at this point. (Teacher T2106U1)
- [The chapter] jumped around a lot but that seems to be the method of this program. (Teacher T2106U2)
- Flip Lessons 1-6 and 1-7 to make it more sequential. The level of difficulty is appropriate. This chapter seems to jump from one concept to another and then back again. (Teacher T2105U1)
- The students had to adjust to new terminology, which was not difficult, but different for them. Also, there were a number of skills which they already knew from 5th grade. (Teacher T2102U1)
- Level of difficulty good. I'm not sure I would include graphing in this chapter. Include rounding. (Teacher T2104U1)

In terms of revision of student materials:

- **What should we definitely not change?**
  - SPUR (Teacher T2106U1)
  - Most lessons were quite good. (Teacher T2106U2)
  - Students really liked the activity. (Teacher T2105U1)
  - Graphing calculator Lesson 1-9, Summary, Self-Test, Chapter Review. (Teacher T2102U1)
  - Lessons 1-1, 1-2, 1-4, 1-5, 1-7, and 1-8. (Teacher T2104U1)
- **What should we definitely change? What ideas do you have for changes that should be made?**
  - Add more visual examples, graphs, tables, pictures. Put multiplication and division of fractions with adding and subtracting. Include GCF as well as LCM. (Teacher T2107U1)

- Maybe, at least for the first chapter, while kids are getting used to all the reading, key words or directions could be underlined in the text. (Teacher T2106U2)
- Delete the words "minus 3" for "negative 3;" the use of vertical number lines. (Teacher T2102U1)
- In Lesson 1-3, the description of ratio and rate is confusing and later questions don't match definitions. In Lesson 1-9, include all the steps to find scatterplots. During Lesson 1-4, the terminology changes from decimal to decimal notation to base 10 numbers. This was confusing for students. (Teacher T2104U1)

In terms of revision of the Teacher's Notes:

- **What should we definitely not change?**
  - Teachers' Notes were as good or better than First and Second Edition notes. (Teacher T2103U1)
  - Pages T3 through T22 are outstanding. Great advice is given. The teacher notes are sufficient for me, since I have been teaching over 30 years, but may be too little for a new teacher. I personally cannot agree with the grading scale since our students are honors students. (Teacher T2102U1)
- **What should we definitely change? What ideas do you have for changes that should be made?**
  - Working from a warm-up for each lesson would be a nice option. (Teacher T2106U2)
  - For grade 6, the homework suggestion is too much. (Teacher T2104U1)
- **Use of Chapter Test provided in Teacher's Notes:**
  - Yes, by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1
    - Explain *deficit*, because kids are only 11 and 12 years old; on #10 indicate trend to let them know all the years' average. (Teacher T2107U1)
    - Question 4 was too easy. Suggest a table with positive and negative values rather than all positive or all negative. (Teacher T2103U1)
    - It works to make each question worth 5 points, but not all questions are equally valuable; some require more work and thinking. (Teacher T2106U1)
    - Too many questions depended on getting the previous question correct. (Teacher T2106U2)
    - Directions for #8 and 9 need to be clearer. The following grades are the raw scores on Chapter 1 Test. [Overall] 30 students took the test. There were 4 points deducted for each problem incorrect, since some problems had more than 1 answer. 96% (1), 92% (1), 90% (2), 88% (3), 86% (1), 85% (1), 84% (1), 82% (5), 80% (1), 78% (4), 74% (2), 72% (1), 70% (1), 68% (2), 62% (2). (Teacher T2102U1)
  - Yes with adaptations: Teacher T2104U1
    - #4-6 were very confusing. Students did not understand the concept of deficit. I did not understand why values were reported as millions when all values were billions. This did not seem realistic. Students did not completely understand #4 (least dollar or least deficit; greatest dollar or greatest deficit). #5-- little space was given to graph. In #9, place value of

digit 9 in expression 429.3×10^8 or in solution to #8. In #10, there is possibly a decrease. In #11, any solution between 0 and 3 000 000 should be acceptable. No information is given; all that is known is that the solution must be contained in the window. For #13, there is no discussion of simplifying when a decimal is in the numerator (i.e., $\frac{9.6}{2}$ to $\frac{24}{5}$). In #18-20, a rate is a comparison. I also included more problems that I stressed in class. Also, I included the technique for finding unit rate. This was one area of weakness of the previous text (Second Edition) as we prepared for state assessment. (Teacher T2104U1)

In terms of the use of supplementary materials:

- **Were any Second Edition materials used?**
  - Yes from Teacher T2104U1 who used Lesson Masters 2-4 and 2-5 with Lesson 1-5 and used ideas from other Lesson Masters.
- **What other supplementary materials were used?**
  - The students purchased *Everyday Mathematics*, Grade 6 journals and Study Links books. These students did some pages in these books for additional homework practice of basic skills. The students had purchased these books before we knew we would be using *Transition Mathematics*. (Teacher T2102U1)
  - At the end of each lesson, I made up a worksheet of sample quiz questions from that lesson similar to a Lesson Master idea. I hoped to organize students' thoughts and make studying for quizzes and tests less confusing. (Teacher T2104U1)

In terms of technology use:

- **Calculator use by teacher**
  - Yes, by Teachers T2107U1, T2103U1, T2106U2, T2105U1, T2102U1, T2104U1
    - With the overhead projector. The calculator requires extra time. (Teacher T2107U1)
    - We went through the powers and different ways to input expressions with parentheses. I did not do Lesson 1-9 because the calculators did not arrive soon enough. Our state standards don't require the use of graphing calculators so I may or may not go back to Lesson 1-9. (Teacher T2103U1)
    - We walked through the steps with students on Lesson 1-9; more basic training on how to use/troubleshoot would be helpful. (Teacher T2106U2)
    - Use the overhead projector to demonstrate to the students so they could graph the function as well. (Teacher T2105U1)
    - Students used the graphing calculator for Lesson 1-9. I used the overhead projector kit to display the calculator screen and the calculator poster to assist students in selecting keys. The students used their scientific calculators and graphing calculators for Lessons 1-4 and 1-5. (Teacher T2102U1)
    - Most students are using a TI 30 II or TI-34II for the first time. I introduced the fraction, the opposite, and the scientific notation keys. With Lesson 1-9, we used the TI-84s. (Teacher F)

    - No by Teacher T2106U1.
- **Calculator use by students**
    - Yes, by students in classes with Teachers T2107U1, T2103U1, T2106U2, T2105U1, T2102U1, T2104U1
        - When the questions required calculation, students used them. (Teacher T2107U1)
        - For normal functions. (Teacher T2103U1)
        - Lesson 1-9 scatterplot. (Teacher T2106U2)
        - To do scatterplots using the STAT key and change the window to the appropriate setting. (Teacher T2105U1)
        - With Lessons 1-4, 1-5, and 1-9. (Teacher T2102U1)
        - They did use a calculator at various times. No calculator was used for Quiz 1-4 to 1-6, Quiz 1-7, 1-8, and the Chapter Test. For Lesson 1-3, a calculator was available; partial use for Lessons 1-4 and 1-5. (Teacher T2104U1)
    - None by students in class of Teacher T2106U1.
- **Loaner calculators to students**
    - Yes, checked out to students: Teachers T2107U1, T2105U1
    - No: Teachers T2103U1, T2106U1, T2106U2, T2102U1, T2104U1
        - Students have access to TI30 in class or own a calculator. (Teacher T2103U1)
        - We did calculator activities in class. I was advised not to check them out for overnight [use] because of the expense involved if they don't get returned. (Teacher T2106U1)
        - I can't risk losing one. (Teacher T2106U2)
        - I did not issue the TI-84 to students for year-long use. It is much too expensive. Students could purchase or borrow a TI-30II or 34II for the entire year. (Teacher T2104U1)
- **Computer use by teacher**
    - Used [the computer] a small amount of time due to late arrival of calculators. (Teacher T2107U1)
    - Did not see any computer applications to incorporate into this chapter. (Teacher T2105U1)
- **Computer use by students**
    - To look up explore questions. (Teacher T2107U1)
    - To find information or to find answers to the exploration questions in some sections. (Teacher T2105U1)

Transition Mathematics (Third Edition): Chapter 2 Evaluation Summary

Lesson	No. Teachers	Mean No. Days (s.d.)	Mean Lesson Rating (s.d.)	Mean Question Rating (s.d.)	Questions Assigned[a]
2-1	7	1.3 (0.5)	4.86 (0.38)	4.29 (0.49)	1-30, 32, 34
2-2	7	1.2 (0.3)	4.57 (0.79)	4.57 (0.53)	1-26, 28
2-3	7	1.1 (0.4)	4.57 (0.53)	4.43 (0.53)	1-18, 20-22, 24
2-4	7	1.1 (0.4)	4.43 (0.53)	4.57 (0.53)	1-18, 20
2-5	7	1.0 (0.0)	4.71 (0.49)	4.86 (0.38)	1-20, 22
2-6	7	1.3 (0.6)	4.71 (0.49)	4.86 (0.38)	1-14, 16, 18, 20
2-7	7	1.1 (0.2)	4.86 (0.38)	4.57 (0.53)	1-28, 30, 32
Self-Test	6[b]	1.0 (0.0)		4.67 (0.52)	1-33
SPUR	7	1.7 (0.4)		4.83 (0.41)	1-72
Overall		13.7 (5.1)	4.36 (0.48)		

Note: Teacher T2107U1 did not indicate a total number of days spent on the chapter; a total was computed based on the number of days recorded as spent on each lesson. Teacher T2103U1 indicated a total number of days but did not indicate a number of days per lesson; based on the total provided, it appears that the teacher spent one day per lesson.

[a] Reflects the questions assigned by at least two-thirds of the teachers who taught the lesson.

[b] Teacher T2107U1 rated the text but not the questions; this teacher did not indicate any problems assigned or days spent on the lesson.

Teacher[a]	Percent of Lessons Covered[b]	Percent of Questions Assigned[c]	Percent of Questions Assigned Based Only on Lessons Taught
T2107U1	100	96	96
T2103U1	100	97	97
T2106U1	100	88	88
T2106U2	100	96	96
T2105U1	100	75	75
T2102U1	100	59	59
T2104U1	100	95	95

[a] Teachers T2106U1 and T2106U2 are at the same school.

[b] Includes lessons, not counting Activities, Self-Test, and SPUR. Percent is based on a total of $n = 7$ lessons.

[c] Based on the total number of questions in lessons, not including Exploration questions, questions in Activities, or questions in Self-Test or SPUR. ($n = 190$)

Comments on the sequence, level of difficulty, or other specific aspects of the content of this chapter

- The text seems to be challenging to the students. (Teacher T2107U1)
- Would you consider using the cross products method on page 70 when comparing fractions? (Teacher T2102U1)
- I wasn't sure Lesson 2-2 fit in this chapter. I would rather see it with order of operations in Chapter 1. The level of difficulty was ok. (Teacher T2104U1)

In terms of revision of student materials:

- **What should we definitely not change?**
  - Do not remove any examples. (Teacher T2107U1)
  - Planning and teaching tips are great. (Teacher T2103U1)
  - I thought it was overall a great chapter. (Teacher T2106U2)
  - Lessons 2-6 and 2-7. (Teacher T2105U1)
  - Lessons 2-6 and 2-7 are outstanding! Also the Progress Self-Test and the Chapter Review are outstanding! (Teacher T2102U1)
  - Lessons 2-1, 2-3, 2-5, 2-6, 2-7. (Teacher T2104U1)
- **What should we definitely change? What ideas do you have for changes that should be made?**
  - Add more similar problems; add prime factorization. (Teacher T2107U1)
  - In Lesson 2-6, add how to change a repeating decimal to a fraction. In Lesson 2-3, add the method of cross products. (Teacher T2102U1)
  - Move Lesson 2-2 to Chapter 1. Define simple fraction in Lesson 2-4. (Teacher T2104U1)

In terms of revision of the Teacher's Notes:

- **What should we definitely not change?**
  - Everything is ok. (Teacher T2104U1)

- **What should we definitely change? What ideas do you have for changes that should be made?**
- **Use of Chapter Test provided in Teacher's Notes:**
    - Yes by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
        - Students struggled understanding #11. I changed heights to km and numbers from 8,850 m to 8.850 km. We didn't do any conversions in metric and then there it is on test. #13 refers back to #11. If you miss 11, you are going to miss 13. (Teacher T2103U1)
        - Leave space for labels above the number line. Also, question 12 asks them to plot the peaks from #11, which were rounded, but the instructions next to the table say to use the table in #11-13. This makes it unclear. (Teacher T2106U1)
        - Test questions were very different from Progress Self-Test and SPUR. These should be more closely matched. (Teacher T2106U2)
        - Question 11 is not covered in the chapter. Question 17 is covered with an exploration question. (Teacher T2105U1)
        - Change #8 and #15 since the students have to carry out these fractions over 6 places to realize that they are repeating. Too long! Also for #24, simplify $\frac{45}{66}$ to $\frac{15}{22}$ to make it easier for students to find LCD. Remove the percent symbol in #14. (Teacher T2102U1)
        - More stress on order of operations, rounding. There is not enough space for answers. #11 is not specifically taught. #21-22 are too time consuming. (Teacher T2104U1)

In terms of the use of supplementary materials:

- **Were any Second Edition materials used?**
    - Used some of Lesson Masters 1-3 and 1-4 to help with rounding; Lesson Master 2-6 with percents. (Teacher T2103U1)
    - Ideas from Lesson Masters were used as a review of some lessons. (Teacher T2104U1)
- **What other supplementary materials were used?**
    - Used a worksheet on GCF and LCM because there were not enough practice problems. (Teacher T2107U1)
    - Students are using *Everyday Math* Journal Volume 1 (Grade 6) for classwork and homework and some of the study links. (Teacher T2102U1)
    - With each lesson, I added sample quiz questions in the form of a worksheet. I mainly used worksheets as a lesson wrap-up and a quick ungraded assessment of student ability. (Teacher T2104U1)

In terms of technology use:

- **Calculator use by teacher**
    - Yes by Teachers T2103U1, T2105U1, T2102U1, T2104U1

        - Briefly reviewed using percent key instead of moving decimal point mentally. (Teacher T2103U1)
        - Doing fraction, decimal, and percent conversions. Technology really helps our students better understand the conversions. (Teacher T2105U1)
        - In Lesson 2-6 to show converting fractions to decimals as suggested in the examples on pages 84 and 85. (Teacher T2102U1)
        - Calculators were used with all lessons except Lesson 2-4. I thought they needed practice with fractions. Usage was limited in Lessons 2-6 and 2-7. Additional work is needed on reading and interpreting calculator displays. Students struggle interpreting and writing repeating decimals and when it is appropriate to round. (Teacher T2104U1)
    - No by Teachers T2107U1, T2106U1, T2106U22
- **Calculator use by students**
    - Yes in classes T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
        - Used if needed to compare fractions. (Teacher T2107U1)
        - For computations (Teacher T2103U1)
        - Basic calculations (Teacher T2106U1)
        - Converting fractions to decimals and percents (Teachers T2106U2, T2104U1)
        - Doing fraction, decimal, and percent conversions. (Teacher T2105U1)
        - In Lesson 2-6 to show converting fractions to decimals as suggested in the examples on pages 84 and 85. (Teacher T2102U1)
- **Other technology use for students**
    - Home computer use (Teacher T2107U1)

Much of the material from this chapter is the same as that in the second edition of *Transition Mathematics*. If you have taught from the second edition, what comments do you have about the changes that were made?

- I really like the combined estimation section 2-5. I would just put it earlier in the chapter. (Teacher T2105U1)
- I like the rearrangement of Chapters 1 and 2 in the new text. It seems more sequential. (Teacher T2104U1)

Other comments:

- State testing occurred during this chapter. (Teacher T2105U1)

Transition Mathematics (Third Edition): Chapter 3 Evaluation Summary

Lesson	No. Teachers	Mean No. Days (s.d.)	Mean Lesson Rating (s.d.)	Mean Question Rating (s.d.)	Questions Assigned[a]
3-1	7	1.3 (0.4)	4.43 (0.79)	4.43) (0.53)	1-30, 32
3-2	7	1.2 (0.4)	4.57 (0.53)	4.57 (0.53)	1-24
3-3	7	1.1 (0.2)	4.57 (0.79)	4.57 (0.53)	1-22, 24, 26
Activity 3-4	5[b]	1.0 (0.4)	4.80 (0.45)	5.00[c] (0.00)	na[f]
3-4	7	1.3 (0.4)	4.57 (0.53)	4.57 (0.53)	1-22, 24-32
3-5	6[d]	1.6 (0.6)	4.83 (0.41)	4.83 (0.41)	1-25
3-6	7	1.1 (0.2)	4.86 (0.38)	4.43 (0.53)	2, 4, 6-16, 18, 20, 22, 24, 26, 28
3-7	7	1.1 (0.2)	4.71 (0.49)	4.71 (0.49)	1-22, 24, 28
Self-Test	7	0.9 (0.2)		4.71 (0.49)	1-29[g]
SPUR	7	2.0 (0.3)		4.86 (0.38)	2-58 evens
Overall		14.6 (2.5)	4.17[e] (0.41)		

Note: Teacher T2107U1 did not indicate a total number of days spent on the chapter; a total was computed based on the number of days recorded as spent on each lesson plus one day for a chapter test.

[a] Reflects the questions asked by at least two-thirds of the teachers who taught the lesson.

[b] Activity not done by Teachers T2103U1 and T2102U1.

[c] Rating based on responses only from Teachers T2106U1, T2106U2, and T2105U1.

[d] Lesson not done by Teacher T2103U1.

[e] Teacher T2103U1 did not provide an overall chapter rating but rated all lessons and question sets as 5.

[f] Teachers T2106U1, T2106U2, and T2105U1 reported doing all 5 problems; although Teachers T2107U1 and T2104U1 reported doing the activity, no problem numbers were listed.

[g] Teacher T2107U1 reported doing the Self-Test but listed no numbers as assigned.

Teacher[a]	Percent of Lessons Covered[b]	Percent of Questions Assigned[c]	Percent of Questions Assigned Based Only on Lessons Taught
T2107U1	100	100	100
T2103U1	80	79	90
T2106U1	100	65	65
T2106U2	100	92	92
T2105U1	100	63	63
T2102U1	90	75	75
T2104U1	100	99	99

[a] Teachers T2106U1 and T2106U2 are at the same school.

[b] Includes lessons, not counting Activities, Self-Test, and SPUR. Percent is based on a total of $n = 7$ lessons.

[c] Based on the total number of questions in lessons, not including Exploration questions, questions in Activities, or questions in Self-Test or SPUR. ($n = 201$)

Comments on the sequence, level of difficulty, or other specific aspects of the content of this chapter

- Vocabulary in the prose and questions is sometimes above grade level. (Teacher T2107U1)
- Seemed like a very logical sequence in this chapter. (Teacher T2106U2)
- The sequence is good. Our students didn't have the background knowledge for some of the topics covered in this chapter. (Teacher T2105U1)
- Students were capable of understanding the skills in this chapter. (Teacher T2102U1)
- Level of difficulty is great. (Teacher T2104U1)

In terms of revision of student materials:

- **What should we definitely not change?**
  - Lessons 3-5 and 3-7. (Teacher T2107U1)
  - Sequence of lessons, lessons using calculators and spreadsheets for formulas. (Teacher T2106U2)
  - Activity 3-4, Lesson 3-5, and 3-7 reading. (Teacher T2105U1)
  - The prose sections in this chapter provide for a clear understanding of the skills being taught. Please keep the vocabulary page at the end of the chapter. (Teacher T2102U1)
  - I liked the chapter; keep lessons as is. (Teacher T2104U1)
- **What should we definitely change? What ideas do you have for changes that should be made?**
  - Wording. The formulas section [should have] more than rectangles or have more sections with formulas. (Teacher T2107U1)
  - A little more instruction on calculator use and spreadsheets. (Teacher T2106U2)
  - Suggestion to add an explanation about symbol reversal, such as $3 > x$ is written better as $x < 3$. (Teacher T2102U1)

- A few of the problems have a goal, but the numbers are a bit too difficult (e.g., #31 in Lesson 3-7). Also, in Lesson 3-2, include an example such as *3 times the sum of* … so that students realize the sum must be done first. (Teacher T2104U1)

In terms of revision of the Teacher's Notes:

- **What should we definitely not change?**
  - Notes were fine. (Teacher T2106U2)
  - I really like the Teacher's Notes for all the chapters. Definitely would not change any of them. (Teacher T2105U1)
  - Teaching ideas and warm-ups are great. (Teacher T2102U1)
  - Great – like the ideas and suggestions. (Teacher T2104U1)
- **What should we definitely change? What ideas do you have for changes that should be made?**
  - Need more instruction for teachers on calculators and spreadsheet use for formulas. (Teacher T2106U2)
  - On T3-17, the information about letters in question 11. Is this question necessary? On T3-24, answer #26 is not a sample answer. $x = 6$ is the only possible answer. (Teacher T2102U1)
- **Use of Chapter Test provided in Teacher's Notes:**
  - Yes by Teachers T2107U1, T2103U1, T2106U11, T2106U2, T2105U1, T2102U1, F
    - Number 6 was confusing. In #7, maybe use the word *examples*; for some reason *instances* is confusing to the students even after they were told what it means. In #11-13, the figure in the book only had one square in it, not two so students were lost. (Teacher T2107U1)
    - Problem #4. All the problems to this point were whole numbers. I had very few students get this correct. The most popular reason for missing the problem was "I couldn't see the pattern." I suggest the test question use whole numbers or give some similar problems during the lesson and Chapter Review. (Teacher T2103U1)
    - Spreadsheet problems 18-22 have errors. Question 22 is ambiguous. (Teacher T2106U2)
    - Questions 2 and 3 on the test are very difficult compared to questions on assigned homework. These should be easier. For #8, 9, and 10, there was not enough practice using parentheses and exponents. (Teacher T2102U1)
    - More questions of basic knowledge, such as graphing inequalities and evaluating algebraic expressions. Written directions are rather confusing to students. I needed to clarify. (Teacher T2104U1)

In terms of the use of supplementary materials:

- **What Second Edition materials were used?**
  - Lesson Masters 4-4, 4-5, and 4-10 were used as worksheets for additional practice. (Teacher T2103U1)
  - A few Lesson Masters for extra practice or quiz questions. (Teacher T2104U1)
- **What other supplementary materials were used?**

- *Everyday Math* Journal I and study link. Students purchased these books for basic skills practice. (Teacher T2102U1)
- I made my own study guides using questions from Lesson Masters or other texts. Students struggle to organize info for studying; this gives them an idea of quiz questions. (Teacher T2104U1)

In terms of technology use:

- **Calculator use by teacher**
  - Yes by Teachers T2107U1, T2106U2, T2105U1, T2102U1, T2104U1
    - Showing them how to set up and enter data. However, not all students could purchase calculators and it takes a lot of time to incorporate them into the lessons. (Teacher T2107U1)
    - To demonstrate formulas for Lesson 3-3. Students love the calculators. (Teacher T2106U2)
    - For graphing some of the review questions and for some computations. I like how the calculators are used throughout the textbook. (Teacher T2105U1)
    - When teaching evaluating expressions and formulas. (Teacher T2102U1E)
    - Graphing calculator activity before Lesson 3-4. Students also used their own 2-line calculators throughout chapter. Technology integration is good. (Teacher T2104U1)
  - No by Teachers T2103U1, T2106U1

- **Calculator use by students**
  - Yes in classes T2107U1A, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
    - Spreadsheets and formulas. (Teacher T2107U1)
    - They were allowed to use them for calculations. (Teacher T2106U1)
    - Students used calculators in Lesson 3-3 for evaluating expressions. I also let them experiment with calculators throughout other lessons. (Teacher T2106U2)
    - For graphing some of the review questions and for some computations. (Teacher T2105U1)
    - Students used calculators on assignments for Lessons 3-3, 3-4, Self-Test and SPUR. (Teacher T2102U1)
    - Students used calculators with all the lessons. I supplement the book with computation done without calculators. Students are also tested on this computation. (Teacher T2104U1)
- **Computer use by teachers**
  - Yes by Teacher T2107U1, T2106U1, T2106U2, T2105U1D, T2102U1
    - I showed them the spreadsheet on my screen. It was a good lesson to give them the experience with spreadsheets and formulas. (Teacher T2107U1)
    - Lesson 3-5 spreadsheet demo. (Teacher T2106U1)
    - To demonstrate how to use Excel and then to demo Lesson 3-5. Using a spreadsheet for more than one lesson would be nice. (Teacher T2106U2)

        - For spreadsheets. I really enjoy teaching these spreadsheets to students. (Teacher T2105U1)
        - For spreadsheets in Lesson 3-5. (Teacher T2102U1)
- **Computer use by students**
    - Yes by students in classes T2107U1, T2106U1, T2106U2, T2105U1, T2102U1
        - Some, but not all, had access to computers at home. The school lab requires previous sign-up dates. (Teacher T2107U1)
        - Lesson 3-5 spreadsheets. (Teachers T2106U1, T2106U2)
        - Students were in the computer lab for 2 days with Lesson 3-5. (Teacher T2106U22)
        - For spreadsheets in the computer lab. (Teacher T2105U1)
        - For use with spreadsheets in the computer lab. (Teacher T2102U1)
- **The activity uses technology to evaluate expressions. How did this activity work?**
    - It worked well after they [the students] understood how to use the calculators. [The technology] provided an ease of calculations and the ability to calculate quickly. (Teacher T2107U1)
    - Students enjoyed it, but I'm not sure how it helped them understand the mathematics. (Teacher T2106U1)
    - Students loved it. They understood applying a pattern or rule to solve formulas. (Teacher T2106U2)
    - After they understood what to do, they liked it. I believe it helped them a lot. (Teacher T2105U1)
    - Great. We also made up a similar problem. The calculators can't do everything for them. They must think to arrive at a formula. (Teacher T2104U1)

- **In Lesson 3-5, students are introduced to spreadsheets. How did this lesson work?**
    - Students were amazed with the ease of calculating. Difficulties related to setting up the calculations and input of data. (Teacher T2107U1)
    - They enjoyed it. No difficulties were noted. (Teacher T2106U1)
    - Students were really excited and seemed more motivated to do math. Some students needed an intro to using a spreadsheet. (Teacher T2106U2)
    - Students really enjoyed learning about how to type in the formulas on the computer. Difficulties occurred when they typed in the wrong formula. (Teacher T2105U1)
    - Students responded positively. Students have used spreadsheets before this time because they were taught these skills in computer class. (Teacher T2102U1)
    - We did only paper spreadsheets. They all have computer class and spreadsheets are included in that curriculum. (Teacher T2104U1)

Other comments:

- Students did much better on these tests since they used a calculator. Mostly As and Bs. (Teacher T2102U1)

Transition Mathematics (Third Edition): Chapter 4 Evaluation Summary

Lesson	No. Teachers	Mean No. Days (s.d.)	Mean Lesson Rating (s.d.)	Mean Question Rating (s.d.)	Questions Assigned[a]
4-1	7	1.0 (0.0)	4.57 (0.53)	4.43 (0.53)	1-24
4-2	7	1.0 (0.0)	4.71 (0.49)	4.57 (0.53)	1-28, 30
4-3	7	1.1 (0.2)	4.71 (0.49)	4.71 (0.49)	1-18, 20, 22, 24
4-4	7[b]	1.3 (0.4)	4.43 (0.53)	4.57 (0.53)	1-14, 16, 18, 20, 22
4-5	7	1.1 (0.2)	4.71 (0.49)	4.43 (0.53)	1-22, 24
Activity 4-6	6[c]	0.8 (0.3)	5.00 (0.00)	5.00 (0.00)	na[f]
4-6	7	1.1 (0.2)	4.43 (0.79)	4.71 (0.49)	1-20, 22, 24, 26
4-7	6[c]	1.0 (0.0)	4.50 (0.55)	5.00 (0.00)	1-16, 18, 20, 22, 24, 26, 28
4-8	7	1.2 (0.4)	4.43 (0.79)	4.71 (0.49)	1-30, 32[g]
Activity 4-9	6[c]	0.8 (0.3)	5.00[d] (0.00)	5.00 (0.00)	na[h]
4-9	6[c]	1.2 (0.3)	4.67 (0.52)	4.83 (0.41)	1-22, 24, 26, 28
Self-Test	7	1.2 (0.4)		4.83[e] (0.41)	na[i]
SPUR	7	1.7 (0.6)		4.67[e] (0.58)	na[j]
Overall	7	15.9 (2.2)		4.57 (0.45)	

[a] Reflects the questions assigned by at least two-thirds of the teachers who taught the lesson.

[b] Teacher T2102U1 assigned problems from the lesson and rated the lesson and questions. However, the teacher failed to indicate the number of days spent on the lesson.

[c] Not done by Teacher T2103U1.

[d] Rating based on responses from Teachers T2107U1, T2106U1, T2105U1, and T2102U1.

[e] Teacher T2103U1 did not rate the Self-Test questions.

[f] Teachers T2107U1, T2102U1, and T2104U1 indicated that they did the Activity but no problems were listed. Hence, there were no problems listed that were assigned by at least two-thirds of the teachers who did the lesson (i.e., that is, four teachers).

[g] Teacher T2103U1 reported teaching the lesson but did not list any problems as assigned.

[h] Teachers T2107U1 and T2104U1 reported doing the activity but listed no problems; Teacher T2102U1 had students do the activity in small groups. Teachers T2106U1, T2106U2, and T2105U1 reported doing all the problems. Problems were indicated with letters from a through u.

[i] Teachers T2107U1 and T2103U1 did the Self-Test but no problems were listed. Teacher T2102U1 also did the Self-Test but it was not clear what problems she assigned. Hence, there were no problems listed for which at least five teachers (i.e., two-thirds of the teachers) assigned the problem. At least four teachers assigned problems 1-36.

[j] Teachers T2107U1, T2103U1, and T2102U1 reported doing SPUR but listed no problems. Hence, there were no problems listed for which at least five teachers (i.e., two-thirds of the teachers) assigned the problem. At least four teachers assigned problems 2-78 even.

Teacher[a]	Percent of Lessons Covered[b]	Percent of Questions Assigned[c]	Percent of Questions Assigned Based Only on Lessons Taught
T2107U1	100	99	99
T2103U1	78	55	70
T2106U1	100	75	75
T2106U2	100	87	87
T2105U1	100	75	75
T2102U1	100	84	84
T2104U1	100	99	99

[a] Teachers T2106U1 and T2106U2 are at the same school.

[b] Includes lessons, not counting Activities, Self-Test, and SPUR. Percent is based on a total of $n = 9$ lessons.

[c] Based on the total number of questions in lessons, not including Exploration questions, questions in Activities, or questions in Self-Test or SPUR. ($n = 256$)

Comments on the sequence, level of difficulty, or other specific aspects of the content of this chapter

- Medium to high. (Teacher T2107U1)
- Students were really engaged in this chapter. I think they enjoyed all the logic, word play and geometry and thought of it as a nice break from "real math." (Teacher T2106U2)
- The sequence is good and at an appropriate level. (Teacher T2105U1)
- All seemed appropriate. (Teacher T2102U1)
- I would put this chapter at beginning of book. (Teacher T2104U1)

In terms of revision of student materials:

- **What should we definitely not change?**
  - The activities and section 4-7. (Teacher T2107U1)
  - *If-then*, Venn diagrams. (Teacher T2106U2)

- 4-2, activity for 4-6, 4-8, activity for 4-9, 4-9. (Teacher T2105U1)
- Progress Self-Test and Chapter Review. (Teacher T2102U1)
- Content. (Teacher T2104U1)

- **What should we definitely change? What ideas do you have for changes that should be made?**
  - Rewrite 4-6. (Teacher T2107U1)
  - Lesson 4-5, questions 20 and 22, almost all students missed it. Lack of understanding. In real world if you say I'll meet you between 10:30 and 12:00, 10:30 and 12:00 would be included so I think this is why students used closed circles on 22. (Teacher T2103U1)
  - If you want to stick with the "at least one" definition for trapezoid, I think you need to explain to teachers and students your rationale for doing so. (Teacher T2106U1)
  - Have all definitions in reading section of text. (Teacher T2104U1)

In terms of revision of the Teacher's Notes:

- **What should we definitely not change?**
  - Your teacher notes are good advice; tips or guidance is great. The more the better. (Teacher T2103U1)
  - Notes were fine. (Teacher T2106U2)
  - I really like the Teachers' Notes. I wouldn't change any of them. (Teacher T2105U1)
  - Teachers' Notes in general are awesome. (Teacher T2102U1)
  - Good. (Teacher T2104U1)
- **What should we definitely change? What ideas do you have for changes that should be made?**
  - Union of rays. (Teacher T2107U1)
- **Use of Chapter Test provided in Teacher's Notes:**
  - Yes by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
    - I did have to skip questions from lessons we skipped. (Teacher T2103U1)
    - Students did better on this chapter test than on past tests. (Teacher T2106U2)
    - Wondering if there should be a line or a ray with the points *K* and *P*. Question 22 was never addressed in the chapter or the section where hierarchies were introduced. Answer for 19b should be pentagon. (Teacher T2105U1)
    - It is recommended that additional problems are given to have students tell what sets particular numbers belong to; for example, what is presented in Section 4-9. (Teacher T2102U1)
    - With adaptations. Need room to show work. Answer lines need to be longer. #4-5, too many elements. Confusion between .2 = $\frac{1}{5}$, are they the same element! (Teacher T2104U1)

In terms of the use of supplementary materials:

- **Did you use any Second Edition materials?**

- No by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1
  - Most of this material is new. (Teacher T2103U1)
- Yes by Teacher T2104U1
  - As study guides for practice. (Teacher T2104U1)

- **What other supplementary materials were used?**
  - None by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1
  - Yes by Teachers T2102U1, T2104U1
    - *Everyday Math* journal and study link. These pages were related to geometry topics. (Teacher T2102U1)
    - Additional worksheets. Students and parents find it very difficult to review for tests using the text. I provide these to assist studying and isolating important ideas. Some worksheets are used as additional practice. (Teacher T2104U1)

In terms of technology use:

- **Calculator use by teacher**
  - Yes by Teacher T2105U1
    - For computations and graphing when needed. I like the way calculator technology is incorporated. (Teacher T2105U1)
  - No by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2102U1
    - It is not necessary to use a calculator in this chapter. (Teacher T2102U1)
  - Students had access to calculator but it was not a necessity for these lessons. (Teacher T2104U1)
- **Calculator use by students**
  - Yes in classes of Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2104U1
    - Review problems (Teacher T2107U1)
    - Computation (Teacher T2103U1)
    - Basic calculation and checking, as in Op-Op Property. (Teacher T2106U1)
    - To check answers or where text indicated. (Teacher T2106U2)
    - For review problems. (Teacher T2104U1)
  - No in classes by Teacher T2102U1
- **Computer use by teachers**
  - No by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
    - [Computer] really isn't incorporated into this chapter. (Teacher T2105U1)
- **Computer use by students**
  - No in classes of Teachers T2107U1, T2103U1, T2106U1, T2102U1, T2104U1
  - Yes in classes of Teacher T2106U2
    - For the activity for 4-9 (classifying numbers on the chart), the students had lots of questions about properties of numbers (i.e., is 0 even, odd, or neither). So I let them go to math sites to do number research. They had fun discovering even more things about numbers than the assignment required. (Teacher T2106U2)
- **Other technology access**
  - Computer lab. (Teacher T2106U2)

In this chapter, students were introduced to the use of hierarchies for polygons, numbers, and objects. Overall, how well did your students handle this concept? To what extent did the content of the hierarchy (polygons, numbers, or objects) impact your students' ability to handle the mathematics underlying the hierarchy)?

- Overall, they received the information clearly. [Hierarchies were helpful for] organizing for better understanding. (Teacher T2107U1)
- Only [do] top students seem to be able to really understand it. It did lay some ground work for Chapter 6. (Teacher T2103U1)
- Pretty well. I'm not sure [of the impact]. (Teacher T2106U1)
- They are already used to classification, so they understood this concept pretty well. The non-mathematical examples really helped. It [the hierarchy] reinforced their mathematical knowledge because they really had to know the properties of whatever they were analyzing to use it in a hierarchy. (Teacher T2106U2)
- It took a while for them to understand how hierarchies worked for they have never seen them before. I think they better understand why some things can be other things, but not the other way around. (Teacher T2105U1)
- Well, since they were doing this skill in science class as well. Using a hierarchy made it clearer for students to understand it. (Teacher T2102U1)
- Drawing of hierarchies made questions easily understandable. They [students] seemed to like these lessons. (Teacher T2104U1)

In this chapter, students had an opportunity to work with *if-then* conditional statements and related statements. How well did your students handle this concept?

- Hard to understand at first, but results were very good after reviewing problems. (Teacher T2107U1)
- Just fine. Most of this concept went very well. (Teacher T2103U1)
- Well. (Teacher T2106U1)
- Surprisingly well, but several related this concept to activities they had done in 6th grade *Everyday Mathematics*. One student asked if it was like the input/output box (if I put in 7 and get out 10, what is happening?). Not exactly the same, but an interesting connection. (Teacher T2106U2)
- They had a hard time understanding converse for a while. (Teacher T2105U1)
- Very well! They thought that it was easy! Related to scientific method. (Teacher T2102U1)
- Seemed easy to grasp these ideas. (Teacher T2104U1)

Other comments:

- In answer key on tests, should $\frac{1}{5}$ or .2 be considered part of intersection on #14. Students received As or Bs on this test. 16 students received a score of 90% thru 94%; 14 students received a score of 80% thru 89%. (Teacher T2102U1)

Transition Mathematics (Third Edition): Chapter 5 Evaluation Summary

Lesson	No. Teachers	Mean No. Days (s.d.)	Mean Lesson Rating (s.d.)	Mean Question Rating (s.d.)	Questions Assigned[a]
5-1	7	1.1 (0.2)	4.71 (0.49)	4.86 (0.38)	1-26, 28, 30, 32, 34
5-2	7	1.3 (0.4)	4.71 (0.49)	4.43 (0.53)	1-32, 34
5-3	7	1.0 (0.0)	4.86 (0.38)	4.71 (0.49)	1-20, 22, 24, 26, 28
5-4	7	1.0 (0.0)	5.00 (0.00)	4.71 (0.49)	1-22, 24, 26, 28
5-5	7	1.1 (0.2)	4.14 (0.69)	4.57 (0.79)	1-20, 22, 24
5-6	7	1.2 (0.4)	4.57 (0.53)	4.57 (0.53)	1-20, 22, 24, 26, 28, 30
5-7	7	1.1 (0.2)	4.86 (0.38)	4.71 (0.49)	1-20, 22, 24, 26
5-8	6[b]	1.6 (0.6)	4.50 (0.84)	4.67 (0.52)	1-22, 24, 26
Activity 5-9	6[b]	1.1 (0.6)	5.00 (0.00)	4.80 (0.45)	1-4
5-9	7	1.0 (0.0)	4.71 (0.49)	4.71 (0.49)	1-14, 16, 18, 20, 22, 24
5-10	7	1.3 (0.4)	4.83 (0.41)	4.67 (0.52)	1-14[e]
Self Test	7	0.9 (0.2)		4.43 (0.79)	1-24[e]
SPUR	7	2.2 (0.9)		4.67 (0.52)	na[f]
Overall		17.6 (1.8)[d]		4.67[c] (0.41)	

[a] Reflects the questions assigned by at least two-thirds of the teachers who taught the lesson.

[b] Not done by Teacher T2103U1.

[c] Teacher T2107U1 did not rate the overall chapter.

[d] Teacher T2106U2 did not list the total number of days spent on the chapter. This value was determined by adding the days spent on each lesson and including a day for a chapter test.

[e] Teacher T2107U1 did the lesson but did not list any questions assigned.

[f] Teacher T2107U1 did the SPUR but did not list any questions. Teacher T2103U1 assigned 2 even problems from each objective. Hence, there were no problems listed that were assigned by at least 5 of the 7 teachers (i.e., two thirds of the teachers doing the lesson). Four teachers assigned the following problems: 2-50.

Teacher[a]	Percent of Lessons Covered[b]	Percent of Questions Assigned[c]	Percent of Questions Assigned Based Only on Lessons Taught
T2107U1	100	90	90
T2103U1	90	65	71
T2106U1	100	86	86
T2106U2	100	90	90
T2105U1	100	75	75
T2102U1	100	78	78
T2104U1	100	96	96

[a] Teachers T2106U1 and T2106U2 are at the same school.

[b] Includes lessons, not counting Activities, Self-Test, and SPUR. Percent is based on a total of $n = 10$ lessons.

[c] Based on the total number of questions in lessons, not including Exploration questions, questions in Activities, or questions in Self-Test or SPUR. ($n = 288$)

Comments on the sequence, level of difficulty, or other specific aspects of the content of this chapter

- I didn't see relevancy of Lesson 5-8 between solving $x + a = b$ and probability. (Teacher T2103U1)
- Lessons 5-1 through 5-4 flowed really well together. Really loved how the first 4 lessons flowed together. (Teacher T2106U2)
- The sequence is good, the level of difficulty is appropriate. (Teacher T2105U1)
- Lesson 5-5 on Rotations doesn't seem to fit in this chapter. I think that it would be better in Chapter 6 with the other geometry skills. (Teacher T2102U1)
- Sequence good. Level of difficulty ok. (Teacher T2104U1)

In terms of revision of student materials:

- **What should we definitely not change?**
  - Overall, I like the chapter as it stands. (Teacher T2107U1)
  - This was a really good chapter. (Teacher T2106U2)
  - Leave 5-3, 5-4, 5-6, Activity for 5-9, and 5-10 as is. (Teacher T2105U1)
  - The equation and inequality sections 5-6 and 5-7 are awesome. (Teacher T2102U1)
  - This chapter is ok with a few minor problem changes. (Teacher T2104U1)
- **What should we definitely change? What ideas do you have for changes that should be made?**
  - More drill problems. (Teacher T2107U1)
  - Lesson 5-5, third paragraph. (Teacher T2106U1)
  - Not sure, but maybe some more practice solving equations in 5-6. Also, 5-8 could use better explanation about how the x, y values from an equation can make coordinates. (Teacher T2106U2)
  - Lesson 5-5 on Rotations. Also, it took 2.5 days to do Section 5-8 because we used calculators to show the lines for the equations and we did the graphs on graph paper as well. (Teacher T2102U1)

- More emphasis on solving equations. (Teacher T2104U1)

- **In Lesson 5-4, students were introduced to fact triangles. How did your students react to this pedagogical strategy? To what extent did the fact triangles influence students' learning of the content of the lesson?**
  - Some could not remember them. (Teacher T2107U1)
  - Great. They were familiar with them and did well. I think it reinforced the concept of the fact family. (Teacher T2103U1)
  - Some did well; others don't "get it." Those that understand it were helped by it. (Teacher T2106U1)
  - Recognized it, but weren't familiar with the idea of one number being shaded – they wanted to know if they "had" to do it that way. (I said yes!) I think they were more comfortable with the lesson since they recognized a part of it. (Teacher T2106U2)
  - They haven't seen this before, but caught on very quickly. I think they learned that there is more than one way to figure out the solution to the problem. (Teacher T2105U1)
  - Students were familiar with fact triangles and they responded very well. They were able to understand addends and sums for + and – by using the fact triangles. (Teacher T2102U1)
  - They [students] were very familiar. I had never seen them before. They [fact triangles] were particularly helpful when solving for a variable and when finding the equation to input in the graphing calculator. (Teacher T2104U1)
- **In Lesson 5-10, probability concepts are extended to include probability with overlap. How well did your students handle this topic?**
  - Seemed confusing after reading but with examples and working problems, the majority did fine. (Teacher T2107U1)
  - Fine. They get a good foundation of probability and Venn diagrams in sixth grade so it went pretty well. (Teacher T2103U1)
  - Pretty well. (Teacher T2106U1)
  - Didn't understand when they read about it, so we talked about it in class and went over examples. (Teacher T2106U2)
  - Our students didn't seem to have a problem with the probability concepts with overlap. (Teacher T2105U1)
  - It was somewhat confusing, since there was new terminology used, as well as Venn Diagrams. (Teacher T2102U1)
  - While reading and doing problems as a class or in groups, they handled it well. The quiz at the end showed that they understood the concept but the terminology was somewhat confusing. (Teacher T2104U1)

In terms of revision of the Teacher's Notes:

- **What should we definitely not change?**
  - Notes were good. (Teacher T2106U2)
  - I really like the Teacher's Notes. I would leave them as is. (Teacher T2105U1)
  - Keep it all! (Teacher T2102U1)
  - Good. (Teacher T2104U1)

- **What should we definitely change? What ideas do you have for changes that should be made?**
    - Good. Add directions for graphing lines on calculator. Hand out step-by-step form. (Teacher T2104U1)
- **Use of Chapter Test provided in Teacher's Notes:**
    - Yes by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
        - I felt they were going to do great on it, but they did not live up to my expectations. The class average was about 72%. (Teacher T2107U1)
        - Question 5, I didn't have any students out of approximately 80 that got $\frac{1}{3}$ for an answer. Only 1 student out of 6 is $\geq$ 5'9 without black hair (Colin). Isn't it simply $\frac{1}{6}$? Nothing in Self-Test evaluates Lesson 5-8. (Teacher T2103U1)
        - Answer key: #2 is 9; #5 is $\frac{1}{6}$; #15 and #16 change 189% to 1.89; #20 graph the answer on the number line and label your point 3.95. (Teacher T2106U1)
        - #7 needs a better graph. This one was too small. (Teacher T2106U2)
        - Answer for question 5 is $\frac{1}{6}$. Answer for question 15 is 1.89. Answer for question 16a is $1.89 - x = 9.35$; answer for question 16b is $1.89 - 9.35 = x$. Students didn't understand questions 12 and 13. (Teacher T2105U1)
        - A fair test! On #14, in place of a and b in the question it should read, "all values of x and y." Answers incorrect on 2, 5, and 15. (Teacher T2102U1)
        - The test should include questions on all levels of thinking. I believe the low level questions were eliminated. I would like to see more $3 + x - 5 = 5 - 7$ questions. Also, #6 used Dow Jones Industrial Averages – I foresaw students trying to figure out an average, so I adapted the question. Skipped #14, misprint with a and b or x and y. Answer to #16 changes 1.89 to 189% for some reason. (Teacher T2104U1)

In terms of the use of supplementary materials:

- **Did you use any Second Edition materials?**
    - No by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1
    - Yes by Teachers T2102U1, T2104U1
        - For the mid-term test, I used the cumulative review test, Chapters 1 to 5. The students were very successful on this test. (Teacher T2102U1)
        - Lesson Masters were used on a few lessons. (Teacher T2104U1)

- **Were other supplementary materials used?**
    - Yes by Teachers T2107U1, T2106U2, T2102U1, T2104U1
        - I used a handout from an old text, *Math Matters: Book 1*, and gave them more one-step equations for extra practice. (Teacher T2107U1)
        - We solved equations together on overhead in 5-6 and 5-7. I just made them up and don't have a hard copy. (Teacher T2106U2)

        - *Everyday Math* program, Book 6: Journal 2, Study Link Grade 6. Students purchased these books at the beginning of the year. These books support the reinforcement of basic skills. (Teacher T2102U1)
        - I continued to make study guides for each lesson. The test is too overwhelming for a few 6th graders, and their parents, studying for a test or quiz. (Teacher T2104U1)
    - No by Teachers T2103U1, T2106U1, T2105U1

In terms of technology use:

- **Calculator use by teacher**
    - Yes by Teachers T2107U1, T2106U2, T2105U1, T2102U1, T2104U1
        - Graphing the example problem. I had students who could use the calculator to graph but did not make the connection [to] a table chart or coordinate points. (Teacher T2107U1)
        - Graphing lines. Maybe students should have a firmer grasp of manually graphing equations before using the "magic" of the calculator. (Teacher T2106U2)
        - Computations and graphing when needed. (Teacher T2105U1)
        - The calculator was used to show absolute value in Lesson 5-2, the negative key and subtraction model in Lesson 5-3, and graphing the equation of the line in Lesson 5-8. Students understand the concepts and skills much easier with the demonstration of the graphing calculator. (Teacher T2102U1)
        - Went over key sequences for subtracting negative numbers. Used graphing calculator for graphing lines. (Teacher T2104U1)
    - No by Teachers T2103U1, T2106U1
- **Calculator use by students**
    - Yes in classes of Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
        - To calculate probability and check their answers when adding integers. (Teacher T2107U1)
        - Computations (Teacher T2103U1)
        - Basic calculation (Teacher T2106U1)
        - General computations and graphing lines (5-8). (Teacher T2106U2)
        - Computations and graphing when needed. (Teacher T2105U1)
        - Calculations while solving problems. When testing, they had selected problems that they could not use a calculator. No graphing calculator for testing. (Teacher T2104U1)
- **Computer use by teachers**
    - Yes by Teacher T2102U1
        - When new skills were introduced, Brain Pop was shown on the computer. (Teacher T2102U1)
    - No by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2104U1
        - [Computer technology] is not really incorporated into this chapter. (Teacher T2105U1)
- **Computer use by students**

    - No in classes of Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
- **Students had an opportunity to work with the graphing utility portion of their calculators in Lesson 5-8. How did your students react to this use of their graphing calculators? To what extent did the graphing capabilities of their calculator influence their understanding and ability with graphing lines?**
    - They thought it was great. Some I feel still did not grasp the concepts of the graph coordinates. (Teacher T2107U1)
    - I'm sorry but we didn't do this lesson. This chapter was around Thanksgiving and to make it work out I skipped this lesson. (Teacher T2103U1)
    - They liked it. [Graphing calculator influenced understanding] little, though they enjoyed seeing the graph appear if they did it correctly. (Teacher T2106U1)
    - Loved it, which is how they always react to the opportunity to use technology. I don't think it [graphing calculators] helped their conceptual understanding, since the calculator does most of the work, but it helped their motivational level! (Teacher T2106U2)
    - They loved it. To some extent it [using a graphing calculator] helped and to some extent it hurt because they could not graph the lines by hand. (Teacher T2105U1)
    - They enjoyed using the calculators and it did help them to understand graphing equations of the line. (Teacher T2102U1)
    - They [students] were happy to use a varying strategy and technique for graphing. They took it as fun; not sure if it added to their learning. (Teacher T2104U1)
- **Other technology access**
    - Computers and other calculators. (Teacher T2107U1)

Transition Mathematics (Third Edition): Chapter 6 Evaluation Summary

Lesson	No. Teachers	Mean No. Days (s.d.)[b]	Mean Lesson Rating (s.d.)	Mean Question Rating (s.d.)	Questions Assigned[a]
6-1	7	1.2 (0.3)	4.50 (0.96)	4.86 (0.38)	1-18, 20
Activity 6-2	5[c]	0.8 (0.3)	4.75 (0.50)	5.00 (0.00)	
6-2	7	1.4 (0.5)	4.50 (0.96)	4.57 (0.53)	1-24, 26, 28, 30, 32
6-3	6[d]	1.3 (0.5)	4.83 (0.41)	4.83 (0.41)	1-15
Activity 6-4	4[e]	0.9 (0.3)	4.75 (0.50)	5.00 (0.00)	
6-4	7	1.4 (0.4)	4.71 (0.49)	4.71 (0.49)	1-22, 24, 26, 28, 30
Activity 6-5	5[c]	1.1 (0.6)	4.40 (0.55)	4.75 (0.50)	
6-5	7	1.3 (0.5)	4.71 (0.49)	4.57 (0.53)	1-24, 26, 28, 30, 32, 34
Activity 6-6	5[c]	0.8 (0.3)	4.80 (0.45)	4.75 (0.50)	
6-6	7	1.3 (0.5)	4.29 (0.49)	4.14 (0.69)	1-24
6-7	7	1.2 (0.4)	4.43 (0.53)	4.86 (0.38)	1-17
6-8	6[d]	1.3 (0.6)	4.83 (0.41)	4.80 (0.45)	1-18
6-9	6[d]	1.3 (0.6)	4.50 (0.55)	4.50 (0.84)	1-11, 14-23
Self-Test	6[d]	0.9 (0.2)		4.50 (0.55)	1-20
SPUR	7	2.0 (0.8)		4.71 (0.49)	1-5, 9-45
Overall		17.7 (5.9)	4.43 (0.53)		

[a] Reflects the questions assigned by at least two-thirds of the teachers who taught the lesson.

[b] Teachers T2107U1 and T2106U1 failed to indicate the total number of days. This value was determined by adding the number of days spent on each lesson plus one day for a chapter test.

[c] Activity not completed by Teachers T2103U1 and T2106U1.

[d] Not completed by Teacher T2103U1.

[e] Completed by Teachers T2107U1, T2106U2, T2105U1, and T2102U1.

[f] Not completed by Teachers T2103U1 and T2106U1.

Teacher[a]	Percent of Lessons Covered[b]	Percent of Questions Assigned[c]	Percent of Questions Assigned Based Only on Lessons Taught
T2107U1	100	99	99
T2103U1	67	52	75
T2106U1	100	86	86
T2106U2	100	90	90
T2105U1	100	58	58
T2102U1	100	66	66
T2104U1	100	83	83

[a] Teachers T2106U1 and T2106U2 are at the same school.

[b] Includes lessons, not counting Activities, Self-Test, and SPUR. Percent is based on a total of $n = 9$ lessons.

[c] Based on the total number of questions in lessons, not including Exploration questions, questions in Activities, or questions in Self-Test or SPUR. ($n = 258$)

Comments on the sequence, level of difficulty, or other specific aspects of the content of this chapter

- I feel this chapter has been assembled very well, understandable for the students and had information in line with this age curriculum. (Teacher T2107U1)
- I loved it! (Teacher T2106U1)
- More examples, especially with 2D and 3D figures. Including graph paper would be helpful. (Teacher T2106U2)
- The content and level of difficulty seemed appropriate. (Teacher T2102U1)
- Reading too technical – written as if it was a geometry book. (Teacher T2104U1)

In terms of revision of student materials:

- **What should we definitely not change?**
  - I liked the whole chapter. (Teacher T2107U1)
  - All the pre-lesson activities were good for discovering <u>why</u> the rules work. (Teacher T2106U2)
  - The activities are excellent, 6-3, and 6-9. (Teacher T2105U1)
  - Activity 6-6 allows students to understand characteristics of rectangles and parallelograms. (Teacher T2102U1)
  - Content is good. (Teacher T2104U1)

- **What should we definitely change? What ideas do you have for changes that should be made?**

- Consider input from other teachers too. As I read the students' section, I thought it was good. My students told me it was just too much stuff. [What is the] value of all the information on their own? (Teacher T2103U1)
- More explanation regarding vocabulary. (Teacher T2106U2)
- Put a section of rotation symmetry in this chapter. (Teacher T2105U1)
- Activity 6-5—It was somewhat confusing with the use of letters for angles. Possibly numbers could be used in the figure. (Teacher T2102U1)
- Change the prose to reflect 6th and 7th grade readers. Remove all questions dealing with examples or activities from the reading. We do not always do reading and questions together. Insert these questions right with activity or example or in Teacher Notes on margin. (Teacher T2104U1)

- **Students had an opportunity to draw in three dimensions with isometric dot paper. How effective was this approach? How did the students react to this activity?**
  - Very [effective] using the isometric paper or graph paper made it easier for the students to draw. [Students reacted] positively, even the students that said they can't draw found they could. (Teacher T2107U1)
  - Didn't use it. (Teacher T2103U1)
  - Good thing I happened to have isometric dot paper! [Activity was] effective for most kids. They enjoyed it. (Teacher T2106U1)
  - Very effective. A few more activities would be helpful. They [students] thought it was fun. (Teacher T2106U2)
  - They [students] saw how to draw 3D shapes in 2D. Needed to supply the isometric paper for this activity. They [students] really liked it. (Teacher T2105U1)
  - We used graph paper to draw figures. They enjoyed it! (Teacher T2102U1)
  - They found it rather confusing the first time they tried. Liked using templates for their 3D drawings. Look at it as a challenge – fun! (Teacher T2104U1)

In terms of revision of the Teacher's Notes:

- **What should we definitely not change?**
  - Notes were great. (Teacher T2106U2)
  - I like all of the Teachers' Notes. I would not change any thing. (Teacher T2105U1)
  - Teacher Notes are clear and teacher friendly. (Teacher T2102U1)
- **Use of Chapter Test provided in Teacher's Notes:**
  - Yes by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
    - This test was easier than any others so far. (That's ok!) (Teacher T2106U1)
    - Numbers 3 & 4 maybe give a hint to draw as a 3D object. (Teacher T2106U2)
    - Question 7 could be changed to (x + -3, y + 4). I don't see reason to use 4.5. Question 12 – don't use the word *convex*. Our students didn't know what that meant [as it] was not covered in the chapter. Question 13 answers show it on isometric paper. Why couldn't they put the isometric paper grid on the test? Question 18 seems very difficult considering there is not a problem in the chapter like it. (Teacher T2105U1)

        - The test and directions were appropriate. Students did very well, with most receiving As and Bs. Students had a quiz toward the middle of the chapter. (Teacher T2102U1)
        - Enlarge drawings. Leave space for work. Combine #1 and 2. Include graph paper for reflections. Number 15 hard to draw reflection. (Teacher T2104U1)

In terms of the use of supplementary materials:

- **Did you use any Second Edition materials?**
    - No by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1
    - Yes by Teacher T2104U1
        - Questions from Lesson Masters for additional worksheets. Usually used in conjunction with lesson. (Teacher T2104U1)
- **What other supplementary materials were used?**
    - None by Teachers T2107U1, T2106U1
    - A quiz was given for Lessons 6-1 through 6-5 and then for Lessons 6-6 and 6-7. (Teacher T2103U1)
    - Used manipulatives of 3D figures into nets. Used pictures of MC Escher tessellations and video to expose kids to the artistic side of tessellations. (Teacher T2106U2)
    - Isometric paper to do the 3D drawings in 2D. (Teacher T2105U1)
    - I am also using Journal 2, Book 6 of *Everyday Mathematics*. The students were learning division of decimals. Students use these materials to consistently review basic skills: operations of fractions and decimals. (Teacher T2102U1)
    - Manipulatives, drawings, floor sketches with masking tape used as visuals to enhance difficult reading. Worksheets for each lesson used as study guides to organize material and prepare for tests and quizzes. (Teacher T2104U1)

In terms of technology use:

- **Calculator use by teacher**
    - Yes by Teachers T2106U2, T2105U1, T2104U1
        - Just for computations. (Teacher T2106U2)
        - For computations when needed. (Teacher T2105U1)
        - Just for calculating purposes. (Teacher T2104U1)
    - No by Teachers T2107U1, T2103U1, T2106U1, T2102U1
- **Calculator use by students**
    - Yes in classes of Teachers T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
        - Computations (Teacher T2103U1)
        - Basic calculation (Teacher T2106U1)
        - Just for calculations (Teacher T2106U2)
        - For computations when needed. (Teacher T2105U1)
        - The students used a calculator when finding missing angles in quadrilaterals on angles in different figures. The SPUR was an appropriate way of using a calculator. (Teacher T2102U1)
        - Calculations. (Teacher T2104U1)
    - No in classes of Teacher T2107U1

- **Computer use by teachers**
  - Yes by Teacher T2102U1
    - I used a smart board to show translations and tessellations. (Teacher T2102U1)
  - No by Teachers T2107U1, T2103U1B, T2106U1, T2106U2, T2105U1, T2104U1
- **Computer use by students**
  - No in classes of Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
- **This chapter discusses the use of dynamic geometry software (DGS) for translations and reflections. Did you use a DGS with this chapter?**
  - No by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
    - [Lack of] calculator training. (Teacher T2107U1)
    - We don't have it [the software]. (Teacher T2106U1)
    - Didn't have any DGS software programs. (Teacher T2105U1)
    - I am not familiar with DGS software. (Teacher T2102U1)
    - Did not have access to DGS nor the time. (Teacher T2104U1)

Other comments:

- Only had 10 days to do chapter. Needed 20-21 Dec to take formative tests for school. 22 Dec was 1st day of Christmas break. So, I had to make some cuts. It's difficult sometimes to get quizzes and activities in and still cover material. (Teacher T2103U1)
- Answer Key: T6-14 #6 drawing is an octagon, not a hexagon. T6-34, #14, angles 4 and 14 should be 5 and 15 for 64°. On p. 333, #16 figure looks like a rectangle – change figure so that $m\angle 1$ looks more like 108°. (Teacher T2102U1)

Transition Mathematics (Third Edition): Chapter 7 Evaluation Summary

Lesson	No. Teachers	Mean No. Days (s.d.)	Mean Lesson Rating (s.d.)	Mean Question Rating (s.d.)	Questions Assigned[a]
7-1	7	1.4 (0.5)	4.57 (0.53)	4.43 (0.53)	1-25, 28
7-2	7	1.3 (0.5)	4.86 (0.38)	4.57 (0.53)	1-30
7-3	7	1.3 (0.4)	4.43 (0.53)	4.71 (0.49)	1-22, 24, 26, 28, 30
Activity 7-4	6[b]	0.8 (0.6)	4.83[e] (0.41)	4.75[f] (0.50)	
7-4	7	1.2 (0.6)	4.57 (0.79)	4.43 (0.53)	1-18, 20, 22, 24, 26, 28
7-5	7	1.3 (0.4)	4.57 (0.53)	4.43 (0.53)	1-22, 24, 26
7-6	6[c]	1.5 (0.5)	4.50 (0.55)	4.33 (0.52)	1-24
Activity 7-7	4[d]	0.9 (0.3)	5.00 (0.00)	5.00[g] (0.00)	
7-7	6[c]	1.7[h] (0.5)	4.67 (0.52)	4.83 (0.41)	1-18, 20
7-8	5[c]	1.6[h] (0.7)	4.33 (0.82)	4.50 (0.84)	1-14, 16, 18
7-9	6[c]	1.2[h] (0.5)	4.50 (0.84)	4.50 (0.84)	1-10, 12, 13
Self-Test	6[c]	1.1 (0.5)		4.60[h] (0.55)	1-20
SPUR	6[c]	1.9 (0.7)		4.33 (0.52)	2-68 even
Overall		17.4 (6.0)	4.36 (0.48)		

[a] Reflects the questions assigned by at least two-thirds of the teachers who taught the lesson.

[b] Teacher T2106U1 did not use Activity 7-4.

[c] Teacher T2106U2 did not teach any lessons after Lesson 7-5.

[d] Activity used by Teachers T2107U1, T2105U1, T2102U1, and T2104U1.

[e] The text of the activity was rated by Teachers T2107U1, T2103U1, T2106U2, T2105U1, T2102U1, and T2104U1.

[f] The questions in the Activity were rated by Teachers T2107U1, T2106U2, T2105U1, T2102U1.

[g] Questions in the Activity rated by Teachers T2107U1, T2105U1, and T2102U1.

[h] Teacher T2104U1 did the lesson but did not indicate the number of days.

Teacher[a]	Percent of Lessons Covered[b]	Percent of Questions Assigned[c]	Percent of Questions Assigned Based Only on Lessons Taught
T2107U1	100	91	91
T2103U1	100	79	79
T2106U1	100	86	86
T2106U2	56	63	100
T2105U1	100	87	87
T2102U1	100	79	79
T2104U1	100	100	100

[a] Teachers T2106U1 and T2106U2 are at the same school.

[b] Includes lessons, not counting Activities, Self-Test, and SPUR. Percent is based on a total of $n = 9$ lessons.

[c] Based on the total number of questions in lessons, not including Exploration questions, questions in Activities, or questions in Self-Test of SPUR. ($n = 231$)

Comments on the sequence, level of difficulty, or other specific aspects of the content of this chapter

- Great sequence. Just needs a few minor corrections. (Teacher T2107U1)
- Sequence ok. Very difficult chapter for most students. Main reason is their reluctance to use formulas and substitute the given values. They want to do it their own way. Successful students did use formulas and utilized all the steps in sequence down to the variables. (Teacher T2103U1)
- Excellent. (Teacher T2106U1)
- Sequence for figuring out area of different shapes was good. (Teacher T2106U2)
- This chapter was very hard for our students, especially when calculating surfaces areas. (Teacher T2105U1)
- I believe that everything is placed properly. (Teacher T2102U1)
- The technical geometric writing had students tuned out. (Teacher T2104U1)

In terms of revision of student materials:

- **What should we definitely not change?**
  - The activities. (Teacher T2107U1)
  - Great problems in ATMs – make students have to think. Keep multiplying, fractions example, especially #4. Liked the way you put circumference and area of circles [in] same lesson. Prisms and cylinders together. (Teacher T2103U1)
  - Don't change anything but the typos. (Teacher T2106U1)
  - Sequence of teaching area. (Teacher T2106U2)
  - Please keep this chapter as written with changes suggested on the first page of this survey. (Teacher T2102U1)
  - Content is great. (Teacher T2104U1)
- **What should we definitely change? What ideas do you have for changes that should be made?**

- Drawings—shade them to represent 3D, not layers. (Teacher T2107U1)
- Add using exact (π included in answer) in your text and in examples. You used $\approx$ until π showed up in the answer key and on the test! (Teacher T2106U1)
- Would you consider adding the following formulas? In Section 7-7, top of page 402, *S.A.* = 2(*LW* + *LH* + *WH*) for *S.A.* of box and on page 403, $V = L \bullet W \bullet H$. In Section 7-8, top of page 410, $S.A. = 2\pi rh + 2\pi r^2$ or $= \pi dh + 2\pi r^2$. (Teacher T2102U1)
- Rather than the technical geometric writing, I would rather see the explanations in everyday English. Save the technical writing for geometry. Also include charts for finding surface areas. (Teacher T2104U1)

- **In 7-4, students were expected to find the area of a triangle by actually measuring. How did students react to this activity? How effective was the Activity on finding the area of a triangle?**
  - [Students reacted] positively. [It] improved the understanding with visual and hands-on. (Teacher T2107U1)
  - [Students] had fun measuring, surprised for the most part that area was the same. Activity is good, but when students are asked to find areas of triangles, many still want to use side not $\perp$ to base they choose or failure to use $\frac{1}{2}bh$ or $\frac{bh}{2}$. Our formative [state practice test] had 50% failure on a question when the base and height were given. No other values were given and they still picked the wrong answer that was twice the area. Formative was on computer so assumption is they didn't take $\frac{1}{2}$ or $\div 2$. (Teacher T2103U1)
  - Skipped it. (Teacher T2106U1)
  - Enjoyed it. Great [in terms of effectiveness] – the hands-on activity helped them understand the formulas in the following lesson. (Teacher T2106U2)
  - They really liked it. Thus the creation of the 7-5 Activity that was created for the students. Very effective. (Teacher T2105U1)
  - The students followed the directions and it helped them to understand the area of a Δ better. [Activity was] great, very effective. (Teacher T2102U1)
  - Great reaction. [Students] liked discovery. [The Activity] helped students discover that there are 3 different heights to 3 different bases. (Teacher T2104U1)
- **In 7-7, students took apart a box and measured its dimensions to find surface area. How did students react to this activity? How effective was the activity on finding the surface area of a box?**
  - [Students reacted] positively also. [The Activity] helped them visualize all the faces. Add a pyramid to the activity. (Teacher T2107U1)
  - Didn't do it. Demonstrated with a model of clear box the 6 surfaces explaining and showing front, back, top, bottom, and side side. Many students still struggle. Maybe need more practice. It's always been a difficult concept when students are tested over it. (Teacher T2103U1)
  - I skipped it for lack of time leading up to state testing. I should not have skipped it. (Teacher T2106U1)

- They really like that. Very effective, but they tried to apply it [to] all the prisms and it didn't work for the general prisms. (Teacher T2105U1)
- Students enjoyed this activity. I provided for each group a box to be measured, such as a cereal box, tissue box, etc. Then each group had a spokesperson discuss the measurements and how they found the *S.A.* Very effective activity. (Teacher T2102U1)
- We did this as a group since we only had a few boxes. Hands-on worked well. Lead [sic] us to make chart for all *SA* problems. (Teacher T2104U1)

- **Comment on the extent to which two activities are sufficient.**
  - Yes, [they were] good. I should have/would have done these, and will next time. (Teacher T2106U1)
  - Most activities this year have been relevant and enjoyable, so more activities that are hands-on would be great. (Teacher T2106U2)
  - Created one for the trapezoids. Should create one for cylinders [and] create one for prisms. (Teacher T2105U1)
  - Very good! (Teacher T2102U1)
  - Sufficient from a time standpoint. I used models when appropriate. (Teacher T2104U1)

In terms of revision of the Teacher's Notes:

- **What should we definitely not change?**
  - Everything is great. Again, love the way you break down lessons with goals, background, warm-ups, and ideas for teaching. (Teacher T2103U1)
  - All Teacher Notes were good. (Teacher T2106U2)
  - I really do love all of the teacher notes. (Teacher T2105U1)
  - Teacher's Notes are excellent. (Teacher T2102U1)
  - Everything ok. (Teacher T2104U1)
- **Use of Chapter Test provided in Teacher's Notes:**
  - Yes by Teachers T2107U1, T2103U1, T2106U1, T2105U1, T2102U1, T2104U1
    - Change the vinyl record to a compact disk. (Teacher T2107U1)
    - I added surface area of triangular prism. Question 11 difficult to understand. Lateral area is hard enough without asking them to multiply it by 24. Basically questions 9-11 too involved. For instance, #9, volume of 1 can or all 24? I know you are going to say they need to read closer. But again do you have any area, lateral area or volume problems in Self-Test or Review where the students are asked to do this. Only my best readers/math students can accomplish multiple task problems. Also, [I] think this chapter is to [sic] much for average students even with 2 more days of practice. A lot to assess. Jus telling you every year we struggle with this chapter. Just look at the large vocabulary list. A lot of concepts. (Teacher T2103U1)
    - Provide more confidence building questions and fewer <u>complex</u> questions. Students really struggled with this test, because every task seemed complex. They failed to do everything required. Big problem: <u>exact</u> circumference was not in text or examples but then showed up on test. (Teacher T2106U1)
    - I really like the test because it's a very challenging test. Just wishing the text would have more problems like these. (Teacher T2105U1)

        - Possibly more distributive property questions could be added like #2. Answer [for] #12 is incorrect on T7-48. It should be $107\frac{2}{3}\ ft^2$. (Teacher T2102U1)
        - Add section of combining like terms and multiplying fractions without calculator. Eliminate #20 because division was not covered and algebraic definition of division is introduced in Lesson 9-3. Question 5, I skipped this problem because I did not feel that I thoroughly covered the concept in class. Questions 9-11, I broke this down into smaller problems to make grading easier. Question 14, I skipped this problem because I did not feel that I thoroughly covered the concept in class. (Teacher T2104U1)
    - No by Teacher T2106U2
        - Did not finish Chapter 7. (Teacher T2106U2)

In terms of the use of supplementary materials:

- **Did you use any Second Edition materials?**
    - Yes by Teachers T2103U1, T2104U1
        - Took lesson masters and cut and pasted to make worksheet for area and circumference of circle. Also for surface area and volume of box. (Teacher T2103U1)
        - Lesson Master questions to supplement each lesson. (Teacher T2104U1)
    - No by Teachers T2107U1, T2106U1, T2106U2, T2105U1, T2102U1
- **What other supplementary materials were used?**
    - None by Teachers T2103U1, T2106U1, T2106U2
    - [Used a worksheet with shapes] so our students could see the power of having formulas for areas. (Teacher T2105U1)
    - I continue to use Grade 6 *Everyday Mathematics* for basic skills and since students purchased these materials at the beginning of the year. Students will be taking a 6th grade standardized test at the end of April and they will need to know basic skills. (Teacher T2102U1)
    - Worksheets, measurement packet that provided one example of perimeter, area of 2D figures, and volume and surface area of 3D figures. [These were] to aid in studying and help with organization. (Teacher T2104U1)

In terms of technology use:

- **Calculator use by teacher**
    - Yes by Teachers T2103U1, T2106U2, T2105U1, T2102U1, T2104U1
        - Programming area formulas. Maybe an activity with programming and problem solving with the calculator [should be added]. (Teacher T2107U1)
        - Reviewed with students the use of parentheses because of distributive property being used so much. Reviewed π symbol and exactness of the symbol over 3.14 and $\frac{22}{7}$. (Teacher T2103U1)
        - On overhead with the class. (Teacher T2106U2)
        - To help with calculations. It [the calculator] was extremely helpful for this chapter. (Teacher T2105U1)

        - A calculator was used throughout the chapter for *S.A.* and volume problems. Using a calculator is a must! (Teacher T2102U1)
        - Calculations/π. (Teacher T2104U1)
    - No by Teachers T2106U1
- **Calculator use by students**
    - Yes in classes of Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
        - Various calculations. (Teacher T2107U1)
        - Computations, use ofπ. (Teacher T2103U1)
        - Basic calculation. (Teacher T2106U1)
        - Finding areas. (Teacher T2106U2)
        - For calculations. (Teacher T2105U1)
        - A calculator was used throughout the chapter for *S.A.* and volume problems. (Teacher T2102U1)
        - Calculations/π. (Teacher T2104U1)
- **Computer use by teachers**
    - No by Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
        - Programs and web sites to demonstrate area/surface area/properties of geometric figures. (Teacher T2107U1)
- **Computer use by students**
    - No in classes of Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, T2102U1, T2104U1
- **Other technology access**
    - Some have computers at home. (Teacher T2107U1)
    - Student 2-line calculators. Did not use loaner calculators. (Teacher T2104U1)

Other comments:

- Our students found the Chapter 7 test to be extremely difficult at best. The highest score recorded for this test was 5 questions correct out of 50. (Teacher T2105U1)
- Since the chapter on measurement is eliminated from this book, a review of conversion is needed, either with the perimeter section of Chapter 6 or before area in Chapter 7. Conversion equations are needed also in Chapter 8, so a chart of conversion equations should be included. I would like to see the elimination of questions in the Covering the Ideas that deal with examples or activities from the reading. On many occasions these questions are not covered in the same day as the reading and recall is difficult. Include these questions in the teacher's manual for additional discussion while the material is still fresh. (Teacher T2104U1)

Transition Mathematics (Third Edition): Chapter 8 Evaluation Summary

Lesson	No. Teachers[b]	Mean No. Days (s.d.)	Mean Lesson Rating (s.d.)	Mean Question Rating (s.d.)	Questions Assigned[a]
8-1	6	1.0 (0.0)	4.67 (0.52)	4.67 (0.52)	1-28, 30, 32, 34
8-2	6	1.1 (0.2)	4.67 (0.52)	4.67 (0.52)	1-18, 20, 22, 24, 26
8-3	6	1.0 (0.0)	4.50 (0.84)	4.67 (0.52)	1-26, 28
8-4	6	1.0 (0.0)	4.67 (0.52)	4.67 (0.52)	1-24, 26
8-5	5[c]	1.1 (0.2)	4.60 (0.55)	4.60 (0.55)	1-18, 20
8-6	5[d]	1.1 (0.2)	4.60 (0.55)	4.80 (0.45)	1-3, 5-20, 22
Activity 8-7	4[e]	0.8 (0.3)	5.00 (0.00)	5.00[f] (0.00)	na[h]
8-7	6	1.1 (0.2)	4.50 (0.84)	4.83 (0.41)	1-16, 18, 20, 22
8-8	6	0.9 (0.2)	4.33 (0.52)	4.80[g] (0.45)	1-12, 14, 16, 18, 20
Activity 8-9	4[e]	0.7 (0.3)	5.00[f] (0.00)	5.00[f] (0.00)	na[h]
8-9	6	1.3 (0.4)	4.50 (0.55)	4.83 (0.41)	1-12, 14, 16, 18, 20, 22
8-10	6	1.2 (0.3)	4.83 (0.41)	5.00 (0.00)	1-14
Self-Test	5[c]	0.9 (0.2)		5.00 (0.00)	1-21[i]
SPUR	5[c]	2.1 (0.7)		4.60 (0.55)	2-48 evens[i]
Overall		16.0 (3.7)	4.42 (0.49)		

[a] Reflects the questions assigned by at least two-thirds of the teachers who taught the lesson.

[b] Teacher T2106U2 did not teach this chapter.

[c] Lesson taught by Teachers T2107U1, T2103U1, T2106U1, T2102U1, and T2104U1.

[d] Lesson taught by Teachers T2107U1, T2106U1, T2105U1, T2102U1, and T2104U1.

[e] Activity used by Teachers T2107U1, T2106U1, T2102U1, and T2104U1.

[f] Ratings based on responses of Teachers T2107U1, T2106U1, and T2102U1 only.

[g] Questions rated by Teachers T2107U1, T2103U1, T2106U1, T2105U1, and T2102U1 only.

[h] Teachers T2107U1, T2102U1, and T2104U1 reported using the Activity but did not list any questions.

[i] Teacher T2103U1 did not list any questions.

Teacher[a]	Percent of Lessons Covered[b]	Percent of Questions Assigned[c]	Percent of Questions Assigned Based Only on Lessons Taught
T2107U1	100	100	100
T2103U1	90	67	75
T2106U1	100	85	85
T2106U2	0	0	NA
T2105U1	90	63	68
T2102U1	100	70	70
T2104U1	100	96	96

[a] Teachers T2106U1 and T2106U2 are at the same school.

[b] Includes lessons, not counting Activities, Self-Test, and SPUR. Percent is based on a total of $n = 10$ lessons.

[c] Based on the total number of questions in lessons, not including Exploration questions, questions in Activities, or questions in Self-Test or SPUR. ($n = 251$)

Comments on the sequence, level of difficulty, or other specific aspects of the content of this chapter

- Sequence was fine. Level of difficulty was generally good, couple of minor bumps. (Teacher T2107U1)
- Ok. (Teacher T2103U1)
- Challenging, but good. (Teacher T2106U1)
- After Chapter 7, our students really liked this chapter. (Teacher T2105U1)
- The section on probability (8-10) doesn't seem to fit in with the other skills, with the exception of the operation of multiplication. (Teacher T2102U1)
- Good in all areas. Difficulty was [that the chapter was] challenging for 6th grade. (Teacher T2104U1)

In terms of revision of student materials:

- **What should we definitely not change?**
  - Some terminology; add some definitions. (Teacher T2107U1)
  - Liked putting expansion and contraction in one lesson instead of two. (Teacher T2103U1)
  - Activities for Lesson 8-7, p. 456 and for Lesson 8-9, p. 466. These activities helped students to understand the lesson very well. (Teacher T2102U1)
  - Content. (Teacher T2104U1)
- **What should we definitely change? What ideas do you have for changes that should be made?**

- Adding direct variation and scale factoring. (Teacher T2107U1)
- 8-9 Activity didn't go well. Only sharpest students saw it. Must have been the way I presented it. Lesson 8-9, hard to get it across so went to separate procedures. Subtract discount price to get sale price. * tax% = tax. Sales price + tax = total. (Teacher T2103U1)
- In Lesson 8-2, pages 433-436, would it be possible to have the rates placed in the numerator of the fraction, instead of in front of the fraction bars? e.g., $90\ \frac{km}{hr}$ would be replaced by $\frac{90\ km}{hr}$. (Teacher T2102U1)
- Consider combining positive and negative size change (8-7 and 8-8). (Teacher T2104U1)

- **To what extent was the Activity for Lesson 8-7 helpful to introduce the lesson?**
  - Reinforces what happens [and] gives a visual. (Teacher T2107U1)
  - Size change was easy to see. Area change was a surprise for students. (Teacher T2103U1)
  - Helpful. (Teacher T2106U1)
  - Don't know, didn't have time for activity. (Teacher T2105U1)
  - This was an excellent activity used to discover similar figures performing expansions or contractions. (Teacher T2102U1)
  - Great discovery learning. The lesson was self explanatory after activity. (Teacher T2104U1)
- **Lesson 8-10 was a new lesson for *Transition Mathematics*. Please comment on how it worked.**
  - The lesson was a success. Other books combine this with dependent events and the students are confused. This was written well and worked. (Teacher T2107U1)
  - New? Isn't throwing two dice the same thing as two in a row? Hence probability goes from $\frac{1}{6}$ to $\frac{1}{36}$. (Teacher T2103U1)
  - It seemed a little disjointed from the rest of the chapter, but once students got the concept, it went well. (Teacher T2106U1)
  - Our students really liked 8-10. I feel it's definitely in the appropriate place. (Teacher T2105U1)
  - Although the students understood this lesson very well, it did not seem to fit in with the rest of the chapter. (Teacher T2102U1)
  - It was a difficult concept. Students understood what independent events were. But on test, I'm not sure they could have determined independent or dependent and calculated probability for each. They knew events would be independent. (Teacher T2104U1)

In terms of revision of the Teacher's Notes:

- **What should we definitely not change?**
  - I love the Teachers' Notes for all of the chapters. (Teacher T2105U1)
  - Teacher notes and warm-ups are excellent! (Teacher T2102U1)
  - Ok. (Teacher T2104U1)

- **Use of Chapter Test provided in Teacher's Notes:**
  - Yes, by Teachers T2107U1, T2103U1, T2106U1, T2105U1, T2102U1, T2104U1
    - Change the shape of problem 18. A Circle was confusing to the students. (Teacher T2107U1)
    - I didn't teach inequality so I took out 10, 15, 19. Also deleted 17, 18. Again, Self-Test and Review have [no] circle expansions or contractions yet you use it for Test? Would have been a good discussion as to why it looks the way it does for learning, not just assessment. #3 – no student got this correct. (Teacher T2103U1)
    - For this test, I used it as a quiz and I used only questions #1 to 14 with each blank worth 3 points. The test seemed very fair. Question #3 was challenging with mistakes occurring on the distributive property with signs. (Teacher T2102U1)
    - Students said and parents said that there were too many concepts on test. Students were not sure which techniques to use and when. The test should include solving and graphing inequalities and no calculator multiplication. (Teacher T2104U1)

In terms of the use of supplementary materials:

- **Did you use any Second Edition materials?**
  - No, by Teachers T2107U1, T2103U1, T2106U1, T2105U1, T2102U1
  - Yes, by Teacher T2104U1
    - As with each chapter, I create a study guide for each lesson to help organize concepts. (Teacher T2104U1)
- **What other supplementary materials were used?**
  - I created a conversion sheet since the measurement chapter was omitted from this book. (Teacher T2104U1)

In terms of technology use:

- **Calculator use by teacher**
  - Yes by Teachers T2107U1, T2105U1, T2102U1, T2104U1
    - On the overhead, to demonstrate some problems. (Teacher T2107U1)
    - To help students with questions. (Teacher T2105U1)
    - The calculator was used mostly in Section 8-9 with % as size changes. (Teacher T2102U1)
    - Calculations, fraction computation (Teacher T2104U1)
  - No by Teachers T2103U1, T2106U1
- **Calculator use by students**
  - Yes in classes of Teachers T2107U1, T2103U1, T2106U1, T2105U1, T2102U1, T2104U1
    - Problem solving. (Teacher T2107U1)
    - Computation (Teacher T2103U1)
    - Basic calculation. (Teacher T2106U1)
    - To work on problems. (Teacher T2105U1)
    - Students used calculators when needed for multiplication problems. (Teacher T2102U1)

        - Calculations. (Teacher T2104U1)
- **Computer use by teachers**
    - No, by Teachers T2107U1, T2103U1, T2106U1, T2105U1, T2102U1, T2104U1
- **Computer use by students**
    - No, in classes of Teachers T2107U1, T2103U1, T2106U1, T2105U1, T2102U1, T2104U1
- **Use of dynamic geometry software with Lesson 8-7**
    - Did not use. (Teacher T2106U1)
    - We used graph paper. (Teacher T2102U1)
- **Other technology access**
    - Computers if needed (Teacher T2105U1)

Transition Mathematics (Third Edition): Chapter 9 Evaluation Summary

Lesson	No. Teachers[b]	Mean No. Days (s.d.)	Mean Lesson Rating (s.d.)	Mean Question Rating (s.d.)	Questions Assigned[a]
9-1	4	1.0 (0.4)	4.75 (0.50)	4.75 (0.50)	1-14
9-2	4	0.9 (0.3)	4.75 (0.50)	4.75 (0.50)	1-15, 17
9-3	4	0.8 (0.3)	4.75 (0.50)	4.75 (0.50)	1-18
9-4	3[c]	1.0 (0.5)	4.75 (0.50)	4.33 (0.58)	1-28
9-5	4	1.1 (0.3)	4.75 (0.50)	4.50 (0.58)	1-20
9-6	3[c]	1.2 (0.6)	4.75 (0.50)	4.33 (0.58)	1-24
9-7	4	0.9 (0.3)	3.75 (1.26)	4.50 (0.58)	1-14
9-8	4	1.3 (0.3)	4.50 (0.58)	4.50 (0.58)	1-20
9-9	4	1.2 (0.3)	4.75 (0.50)	4.75 (0.50)	1-19
Activity 9-10	3[c]	0.7 (0.3)	5.00 (0.00)	4.75[d] (0.50)	1-3
9-10	4	1.1 (0.5)	4.75 (0.50)	5.00 (0.00)	1-5
Self-Test	4	0.7 (0.3)		4.75 (0.50)	1-22
SPUR	4	1.4 (0.8)		4.67[e] (0.58)	2-52 evens
Overall		13.3 (4.1)	4.50 (0.58)		

[a] Reflects the questions assigned by at least two-thirds of the teachers who taught the lesson.

[b] Teachers T2106U1, T2106U2, and T2105U1 did not teach the chapter.

[c] Lesson taught by Teachers T2107U1, T2102U1, and T2104U1 only.

[d] Rating based on responses from Teachers T2107U1, T2103U1, T2102U1, and T2104U1.

[e] Rating based on responses from Teachers T2107U1, T2102U1, and T2104U1 only.

Teacher[a]	Percent of Lessons Covered[b]	Percent of Questions Assigned[c]	Percent of Questions Assigned Based Only on Lessons Taught
T2107U1	100	98	98
T2103U1	80	59	77
T2106U1	0	0	NA
T2106U2	0	0	NA
T2105U1	0	0	NA
T2102U1	100	56	56
T2104U1	100	85	85

[a] Teachers T2106U1 and T2106U2 are at the same school.

[b] Includes lessons, not counting Activities, Self-Test, and SPUR. Percent is based on a total of $n = 10$ lessons.

[c] Based on the total number of questions in lessons, not including Exploration questions, questions in Activities, or questions in Self-Test or SPUR. ($n = 234$)

Comments on the sequence, level of difficulty, or other specific aspects of the content of this chapter

- Sequence was fine. Some problems were too easy. (Teacher T2107U1)
- Everything was good. Difficulty – #22 Lesson 9-1 only 2-3 students per class got this correct on their own. (Teacher T2103U1)
- This chapter was easy for the students to understand. Many of the skills were taught previously, so we could go through this chapter quickly. (Teacher T2102U1)
- Good. (Teacher T2104U1)

In terms of revision of student materials:

- **What should we definitely not change?**
  - The activities. (Teacher T2107U1)
  - Ratio and proportion (Sections 9-6, and 9-8 on means-extremes property for proportions). (Teacher T2102U1)
  - Mention the division method of solving equations in the multiplication section. (Teacher T2104U1)
- **What should we definitely change? What ideas do you have for changes that should be made?**
  - Add more drill. [Need] more straight forward problems. (Teacher T2107U1)
  - On Lesson 9-7, the understanding of a proportion is great (p. 516); however, the solutions for solving a proportion (p. 517) were confusing for students. Would it be possible to combine 9-7 and 9-8 together? (Teacher T2102U1)
  - Combine 9-7 and 9-8, removing Example 1 method from Lesson 9-7. (Teacher T2104U1)
- **Most of this chapter is similar to the corresponding chapter in the Second Edition. In what ways is the Third Edition chapter better? What topics from the Second Edition should have been included that are not?**

    - [Third Edition better in following ways] More Applying the Math questions in 9-1. More review questions on current lessons. Like addition of division and equations. I think proportional thinking before proportions in figures is good; it gives students more opportunity to use proportional thinking. It appeared to me that Second Edition Chapter 11 was all in Chapter 9 of Third Edition. Didn't see anything major that you left out from Second. Did I miss something? (Teacher T2103U1)
    - I never taught Chapter 11 in [the] old book so I am not aware of differences. (Teacher T2104U1)
- **To what extent did use of fact triangles help students understand the mathematics of the chapter?**
    - They helped. (Teacher T2107U1)
    - I think it helped (the lower students especially). Higher students already have the fact triangles or fact family in their heads. They already know the concept. Keep it. (Teacher T2103U1)
    - The fact triangles have been very useful in understanding factors and products and how to show inverse operations. (Teacher T2102U1)
    - Fact triangles allowed students to rearrange equations to make solving easier. They did not need to solve for a given variable. (Teacher T2104U1)
- **How did students react to the In-Class Activity for Lesson 9-10?**
    - Positively. [The activity took] approximately 1.5 days. (Teacher T2107U1)
    - They liked doing it. [It took] 25-30 minutes. After 1st hour, I reduced the requirement to only 3 of the 5 measurements. (Teacher T2103U1)
    - This activity helped to explain similar figures and their ratios. [The activity took] about 20 minutes during a group activity. (Teacher T2102U1)
    - Discovery learning helped students understand similar figures. Each student in group calculated a ratio of corresponding sides only to find they were all equal. Because each student did one ratio and we did not complete #4, [the activity] only took about 15-20 minutes. (Teacher T2104U1)

In terms of revision of the Teacher's Notes:

- **What should we definitely not change?**
    - The Teachers' Notes with the warm-ups and ideas for teaching are excellent for each lesson. (Teacher T2102U1)
    - Good. (Teacher T2104U1)
- **What should we definitely change? What ideas do you have for changes that should be made?**
    - I am not sure whether the students are ready for eliminating denominators with proportions in Lesson 9-7. My students better understood the means-extremes property. (Teacher T2102U1)
- **Use of Chapter Test provided in Teacher's Notes:**
    - Yes by Teachers T2103U1, T2102U1, T2104U1
        - #18 was confusing, since it has 2 variables; otherwise this test was a pleasant surprise for the students who did very well, mostly As and Bs with the use of a calculator. (Teacher T2102U1)

        - Good questions. I did not use all questions. In order to save class time, I incorporated some of the questions in the quizzes used in this chapter. No actual chapter test was given at the end of the chapter. (Teacher T2104U1)
    - No by Teacher T2107U1
        - Ran out of time. (Teacher T2107U1)

In terms of the use of supplementary materials:

- **Did you use any Second Edition materials?**
    - No, by Teachers T2107U1, T2103U1, T2102U1
    - Yes, by Teacher T2104U1
        - Lesson Masters as study guides or Lesson Master questions for quizzes. (Teacher T2104U1)
- **What other supplementary materials were used?**
    - Quizzes made with Lesson Master questions, my own questions or Chapter Test questions. Journal entry question for state assessment practice. [These were done for] assessment purposes. (Teacher T2104U1)

In terms of technology use:

- **Calculator use by teacher**
    - Yes by Teachers T2102U1, T2104U1
        - Students used the calculator throughout the chapter. (Teacher T2102U1)
        - Calculators used for computation. (Teacher T2104U1)
    - No, by Teachers T2107U1, T2103U1
        - [Should there be an] activity to program proportions on a spreadsheet. (Teacher T2107U1)
- **Calculator use by students**
    - Yes, in classes of Teachers T2107U1, T2103U1, T2102U1, T2104U1
        - Computations. (Teacher T2107U1)
        - Computations, fractions. (Teacher T2103U1)
        - Calculators used for computation. (Teacher T2104U1)
- **Computer use by teachers**
    - No, by Teachers T2107U1, T2103U1, T2102U1, T2104U1
- **Computer use by students**
    - No, in classes of Teachers T2107U1, T2103U1, T2102U1, T2104U1
- **Other technology access**
    - Their own 2-line calculators. (Teacher T2104U1)

Other comments:

- [More] spreadsheets? (Teacher T2107U1)

Transition Mathematics (Third Edition): Chapter 10 Evaluation Summary

Lesson	No. Teachers[b]	Mean No. Days (s.d.)	Mean Lesson Rating (s.d.)	Mean Question Rating (s.d.)	Questions Assigned[a]
10-1	3	1.5 (0.5)	5.00 (0.00)	5.00 (0.00)	1-18, 20, 22, 24
10-2	3	1.5 (0.5)	5.00 (0.00)	5.00 (0.00)	1-11, 13, 15-22
Activity 10-3	0				
10-3	3	1.3 (0.6)	4.33 (0.58)	5.00 (0.00)	1-16, 18
10-4	3	1.3 (0.6)	5.00 (0.00)	5.00 (0.00)	1-20, 22
10-5	1[c]	1.0	5.00	5.00	1-6, 8-14
10-6	2[d]	1.5 (0.7)	5.00 (0.00)	5.00 (0.00)	1-19
10-7	1[e]	0.5	4.00	na[f]	na[g]
10-8	0				
Self-Test	2[d]	1.0 (0.0)		5.00 (0.00)	na[h]
SPUR	2[d]	1.5 (0.7)		5.00 (0.00)	na[h]
Overall		10.3 (2.5)	5.00 (0.00)		

[a] Reflects the questions assigned by at least two-thirds of the teachers who taught the lesson.

[b] Teachers T2107U1, T2106U1, T2106U2, and T2105U1 did not teach the chapter. Teacher T2102U1 only taught Lessons 10-1 through 10-4.

[c] Taught by Teacher T2103U1 only.

[d] Taught by Teachers T2103U1 and T2104U1 only.

[e] Taught by Teacher T2104U1 only.

[f] Questions not rated.

[g] Teacher T2104U1 talked about the vocabulary from the lesson but did not assign problems.

[h] Teacher T2104U1 did not list any problems, so there are no problems that were assigned by at least two-thirds of the teachers who taught the lesson.

Teacher[a]	Percent of Lessons Covered[b]	Percent of Questions Assigned[c]	Percent of Questions Assigned Based Only on Lessons Taught
T2107U1	0	0	NA
T2103U1	75	49	65
T2106U1	0	0	NA
T2106U2	0	0	NA
T2105U1	0	0	NA
T2102U1	50	33	66
T2104U1	75	55	71

[a] Teachers T2106U1 and T2106U2 are at the same school.

[b] Includes lessons, not counting Activities, Self-Test, and SPUR. Percent is based on a total of $n = 8$ lessons.

[c] Based on the total number of questions in lessons, not including Exploration questions, questions in Activities, or questions in Self-Test or SPUR. ($n = 195$)

Comments on the sequence, level of difficulty, or other specific aspects of the content of this chapter

- The first four lessons seemed to be just right. The equations and inequalities given were at a variety of easy to difficult. (Teacher T2102U1)
- Good. (Teacher T2104U1)

In terms of revision of student materials:

- **What should we definitely not change?**
  - Graphs and applications of graphs are excellent. (Teacher T2102U1)
  - Looks good. I wish I had more time. (Teacher T2104U1)
- **What should we definitely change? What ideas do you have for changes that should be made?**
  - Lesson 10-7 after 10-4. (Teacher T2104U1)
- **This chapter contains most of the book's presentation on linear sentences. Comment on the pros and cons of concentrating the ideas in one chapter.**
  - I liked one chapter. Most of the students were successful in learning the procedure to solve for the variable. (Teacher T2103U1)
  - I believe that it is better to have a whole chapter dedicated to this topic, rather than scattering them across the textbook. (Teacher T2102U1)
  - I liked it in one chapter even though we couldn't finish it all. (Teacher T2104U1)
- **Lesson 10-2 is a new lesson. How did your students respond?**
  - Very positive. Most already understood the concept from *Everyday Math* and our science classes. (Teacher T2103U1)
  - The students responded very well and the graph enabled the students to understand the story problems given. (Teacher T2102U1)
  - I liked it and they liked it. It is very useful for state assessments. (Teacher T2104U1)
- **Lesson 10-8 is also a new lesson. How did your students respond?**

- Skipped. (Teacher T2103U1)
- Did not teach. (Teacher T2102U1)
- We had to skip this lesson because of time. (Teacher T2104U1)

- **Variables on both sides of the equation occurred late in the Second Edition. Comment on the advantages of moving this topic earlier as done in the Third Edition.**
  - Moving it earlier helps ensure students get to it. Quite often, the last chapters are covered in parts or skipped entirely. Also, it helps with Chapter 12, graphs of formulas and Pythagorean Theorem. (Teacher T2103U1)
  - I believe that all the equation types should be presented in the same chapter. (Teacher T2102U1)
  - Necessary to keep it early in text so that it gets covered before time runs out. (Teacher T2104U1)

In terms of revision of the Teacher's Notes:

- **What should we definitely not change?**
  - Everything is great. (Teacher T2102U1)
- **Use of Chapter Test provided in Teacher's Notes:**
  - Yes, by Teachers T2103U1, T2104U1
    - Good test. Many students missed the west/east instructions on #19. Also, if you continue to have test questions using large numbers (millions in #9), ensure you have several practice problems using millions in the lessons. (Teacher T2103U1)
    - I used test questions on quizzes. I did not have time for a chapter test. (Teacher T2104U1)
  - No, by Teacher T2102U1 because she did not finish the chapter.

In terms of the use of supplementary materials:

- **Did you use any Second Edition materials?**
  - No, by Teachers T2103U1, T2102U1
  - Yes, by Teacher T2104U1
    - After each lesson taught, I made a worksheet of Lesson Master questions or questions from Progress Self-Test or Chapter Review. (Teacher T2104U1)
- **What other supplementary materials were used?**
  - Used hands-on manipulatives and techniques for solving equations. Hands-On Equations is a great program. Students respond to the manipulative techniques. We then transferred the ideas and notation to algebra notation. (Teacher T2104U1)

In terms of technology use:

- **Calculator use by teacher**
  - Yes by Teachers T2102U1, T2104U1
    - The students used the graphing calculator to see equations graphed in the form $y = mx + b$. Excellent [calculator] strategies! (Teacher T2102U1)
    - Used for calculations. Had no time for Activity 10-3 with graphing calculator. (Teacher T2104U1)

    - No, by Teacher T2103U1
        - I think using graphing calculators and showing students how it works is great. But for 8th grade, we have no requirement by the state standards for this learning. (Teacher T2103U1)
- **Calculator use by students**
    - Yes, in classes of Teachers T2103U1, T2102U1, T2104U1
        - Calculations only, no graphing. (Teacher T2103U1)
        - Students used the calculator to do the computation on the equations and inequalities and to check their solutions. The students used the graphing calculator to see equations graphed in the form $y = mx + b$. (Teacher T2102U1)
        - Calculations. (Teacher T2104U1)
- **Computer use by teachers**
    - No, by Teachers T2103U1, T2102U1, T2104U1
- **Computer use by students**
    - No, in classes of Teachers T2103U1, T2102U1, T2104U1

Other comments:

- I would recommend that more equation and inequalities be given in Lessons 10-3 and 10-4 for extra practice. For example, more problems like #8-13 on p. 559. (Teacher T2102U1)

Transition Mathematics (Third Edition): Chapter 11 Evaluation Summary

Lesson	No. Teachers[b]	Mean No. Days (s.d.)	Mean Lesson Rating (s.d.)	Mean Question Rating (s.d.)	Questions Assigned[a]
11-1	1	1.0	5.00	5.00	1-10
11-2	1	1.0	4.00	5.00	1-10, 17, 18
11-3	1	1.0	4.00	5.00	1-7
Activity 11-4	0				
11-4	0				
11-5	0				
11-6	0				
Self-Test	0				
SPUR	0				
Overall	0	4+			

[a] Reflects the questions assigned by at least two-thirds of the teachers who taught the lesson.

[b] Teachers T2107U1, T2103U1, T2106U1, T2106U2, T2105U1, and T2102U1 did not teach any part of the chapter. Because of state testing, Teacher T2103U1 chose to skip this chapter and do part of Chapter 12.

Teacher[a]	Percent of Lessons Covered[b]	Percent of Questions Assigned[c]	Percent of Questions Based Only on Lessons Taught
T2107U1	0	0	NA
T2103U1	0	0	NA
T2106U1	0	0	NA
T2106U2	0	0	NA
T2105U1	0	0	NA
T2102U1	0	0	NA
T2104U1	50	21	45

[a] Teachers T2106U1 and T2106U2 are at the same school.

[b] Includes lessons, not counting Activities, Self-Test, and SPUR. Percent is based on a total of $n = 6$ lessons.

[c] Based on the total number of questions in lessons, not including Exploration questions, questions in Activities, or questions in Self-Test or SPUR. ($n = 135$)

Comments on the sequence, level of difficulty, or other specific aspects of the content of this chapter

- I liked Lessons 1-3, but because of time I could not cover the remaining lessons. (Teacher T2104U1)

In terms of revision of student materials:

- **What should we definitely change? What ideas do you have for changes that should be made?**
  - If you are going to introduce mean absolute deviation in 11-2, explain uses in analyzing data. (Teacher T2104U1)
- **This entire chapter is new and concentrates on statistics, with an emphasis in one chapter rather than lessons interspersed throughout the book. Comment on this approach.**
  - Good. I believe it would be a great last chapter. I did teach selected sections of Chapter 12 before Chapter 11. (Teacher T2104U1)

In terms of revision of the Teacher's Notes:

- **Use of Chapter Test provided in Teacher's Notes:**
  - No, by Teacher T2104U1
    - Only covered Lessons 1-3.

In terms of the use of supplementary materials:

- **Did you use any Second Edition materials?**
  - Yes, by Teacher T2104U1
    - Study guides and additional practice. (Teacher T2104U1)
- **What other supplementary materials were used?**
  - Worksheets from problem solving workbook used as additional practice. Additional practice and activities [were used] while students were called from class for concert practices. (Teacher T2104U1)

In terms of technology use:

- **Calculator use by teacher**
  - Yes by Teacher T2104U1
    - Used for calculations of average. (Teacher T2104U1)
- **Calculator use by students**
  - Yes, in classes of Teacher T2104U1
    - Calculations of statistics. (Teacher T2104U1)
- **Computer use by teachers**
  - No, by Teacher T2104U1
- **Computer use by students**
  - No, in classes of Teacher T2104U1

Transition Mathematics (Third Edition): Chapter 12 Evaluation Summary

Lesson	No. Teachers[b]	Mean No. Days (s.d.)	Mean Lesson Rating (s.d.)	Mean Question Rating (s.d.)	Questions Assigned[a]
12-1	2	1.0 (0.0)	5.00 (0.00)	5.00 (0.00)	1-19
12-2	2	1.0 (0.0)	5.00 (0.00)	5.00 (0.00)	1-24
Activity 12-3	1[c]	1.0	5.00		
12-3	2	1.0 (0.0)	5.00 (0.00)	5.00 (0.00)	1-9
12-4	1[c]	1.0	5.00	5.00	1-20
12-5	1[c]	1.0	5.00	5.00	1-18
12-6	0				
Self-Test	1[c]	1.0		5.00	na[f]
SPUR	2	1.3 (1.1)		5.00 (0.00)	na[g]
Overall		7.5[d] (5.0)	5.00[e]		

[a] Reflects the questions assigned by at least two-thirds of the teachers who taught the lesson.

[b] Teachers T2107U1, T2106U1, T2106U2, T2105U1, and T2102U1 did not teach any parts of the chapter.

[c] Done by Teacher T2103U1 only.

[d] Teacher T2103U1 spent 11 days on the chapter; Teacher T2104U1 spent 4 days.

[e] Teacher T2103U1 rated the chapter 5; Teacher T2104U1 rated the chapter as *good*.

[f] Teacher T2103U1 did not list any questions as assigned.

[g] Teacher T2104U1 assigned problems 1-21; Teacher T2103U1 did not list any problems as assigned.

Teacher[a]	Percent of Lessons Covered[b]	Percent of Questions Assigned[c]	Percent of Questions Assigned Based Only on Lessons Taught
T2107U1	0	0.0	
T2103U1	83	69.7	
T2106U1	0	0.0	
T2106U2	0	0.0	
T2105U1	0	0.0	
T2102U1	0	0.0	
T2104U1	50	39.4	

[a] Teachers T2106U1 and T2106U2 are at the same school.

[b] Includes lessons, not counting Activities, Self-Test, and SPUR. Percent is based on a total of $n = 6$ lessons.

[c] Based on the total number of questions in lessons, not including Exploration questions, questions in Activities, or questions in Self-Test or SPUR. ($n = 142$)

Comments on the sequence, level of difficulty, or other specific aspects of the content of this chapter

- I would like to see this chapter after Chapter 10. Time limitations allowed me to complete 12-1 through 12-3 only. (Teacher T2104U1)

In terms of revision of student materials:

- **What should we definitely change? What ideas do you have for changes that should be made?**
  - More Pythagorean theorem problems using everyday applications. Place this chapter after Chapter 10. (Teacher T2104U1)
- **Lesson 12-4 is a new lesson. How did your students react?**
  - Ok. Practical use of Pythagorean theorem. (Teacher T2103U1)
  - I would have liked to cover this lesson, but had no time. (Teacher T2104U1)
- **Except for Lesson 12-4, the lessons in this chapter are rewrites from Chapters 12 and 13 of the Second Edition. How would you compare the two editions?**
  - Never taught Chapters 12 and 13 of Second Edition. (Teacher T2104U1)
- **Is this chapter a good way to end the course?**
  - Yes. You've established a good foundation for algebra and geometry. Graphing of additional formulas should get students thinking of the use and advantage of algebraic and geometric concepts. (Teacher T2103U1)
  - Rather see the course end with Chapter 11. (Teacher T2104U1)

In terms of revision of the Teacher's Notes:

- **What should we definitely not change?**
  - It's all good, especially backgrounds. Appreciated teaching ideas. (Teacher T2103U1)
- **Use of Chapter Test provided in Teacher's Notes:**

- Yes by Teachers T2103U1, T2104U1
  - But only a few questions that we covered. (Teacher T2104U1)

In terms of the use of supplementary materials:

- **Did you use any Second Edition materials?**
  - No, by Teacher T2103U1
  - Yes, by Teacher T2104U1
    - Practice worksheets made from Lesson Master questions. (Teacher T2104U1)

In terms of technology use:

- **Calculator use by teacher**
  - Yes, by Teachers T2103U1, T2104U1
    - For square roots. Good [calculator suggestions] (Teacher T2103U1)
    - Calculations and square roots with Lessons 12-2, 12-3. (Teacher T2104U1)
- **Calculator use by students**
  - Yes in classes of Teachers T2103U1, T2104U1
    - Calculations (Teacher T2103U1)
    - Calculations and square roots with Lessons 12-2 and 12-3. (Teacher T2104U1)
- **Computer use by teachers**
  - No, by Teachers T2103U1, T2104U1
- **Computer use by students**
  - No, in classes of Teachers T2103U1, T2104U1
- **Other technology access**
  - Their own 2 line calculators. (Teacher T2104U1)

Other comments:

- Thanks again for selecting our school for your evaluation. Wish I would have had more suggestions but I thought everything was well thought out and the teacher section was better than ever. The student sections were easier reading. Additional examples were good and updating problems to modern real world problems was great (i.e., LeBron James/Michael Jordan). (Teacher T2103U1)