To fully prepare students in Texas for success in college, in the workplace, and life in the 21st century, rigorous academic standards were developed. These standards place a focus on improving student achievement and go beyond fundamental knowledge and skills. The Texas Essential Knowledge and Skills (TEKS) promote increased accountability in education. Educators may examine the Standards for Mathematics to improve the what and how of instruction. While these standards identify what students are to know and be able to do, the “how” decision remains with individual districts, schools, and teachers. Schools in Texas must align standards, instruction, and assessments with 21st century skills. Furthermore, students must learn how to apply these skills in the context of the real world. Research indicates that students understand and retain more when learning is relevant, engaging, and meaningful to students’ lives. Instruction that focuses on the TEKS demonstrates rigor and relevance in today’s classrooms. Total Motivation Math was developed specifically around the Mathematics Standards for Texas and serves as a resource to support teachers in the implementation of mathematics education.

Mathematics is a universal subject, so much a part of life that anyone who is a participating member of society must know basic mathematics. Students’ mathematical achievement, however, is ultimately determined and limited by the opportunities they have had to learn. Mathematics is not restricted to a select group of students. As Kilpatrick, Swafford, and Finder (2001) argued, “All students must learn to think mathematically, and they must think mathematically to learn.” The RAND Mathematics Study Panel (2003) also emphasized the importance of mathematics. Furthermore, the panel declared that it is essential that students develop math proficiency. With the passing of the Every Student Succeeds Act (ESSA), this federal law requires that academic assessments for “math and reading or language arts be administered annually in grades 3-8 and at least once in grades 9-12” (Mandlawitz, 2016, p. 1). The critical issue of accountability will continue with ESSA, but assessments will be used to help improve schools and inform instruction. The law allows the state and local levels the opportunity to create systems for accountability, resources, interventions and teacher evaluation systems. The federal requirements of ESSA mandate that all students participate in the state assessment program.

The United States Department of Education (2004) shared that “the recent National Assessment of Educational Progress (NAEP, the Nation’s Report Card) showed that 27% of eighth-graders could not correctly shade 1/3 of a rectangle and 45% could not solve a word problem that required dividing fractions.” Philips (2007) offered statistics that indicated adults have difficulties with everyday applications of mathematics in the real world. Other research indicates that students and adults experience problems in foundational mathematical skills (Hecht, Bagi, & Torgeson, 2007). The Third International Mathematics and Science Study (TIMSS) released data that indicated that students in the United States experience deficits in science and mathematics education as compared to 41 other countries. Fourth graders from the U.S. achieved the top ranking in science and the middle ranking in mathematics. However, eighth graders from the United States performed just above the median in science and below the median in mathematics. This trend does not bode favorably for the United States. Based on these findings, the evidence clearly shows mathematics literacy is a serious problem in the United States. Therefore, it is understandable why the National Mathematics Advisory Council (NMAC) expresses concern for mathematics education in the United States. While some data indicate progress, there continues to be a need for the United States to
focus on improvement in mathematics education. Thus, the resource Total Motivation Math was designed to offer teachers and students a quality resource for the purpose of increasing student performance and teacher instruction in mathematics.

Total Motivation Math is a rigorous and relevant supplemental Levels 1-8 mathematics resource developed by Texas educators to integrate critical thinking and focused aligned reinforcement into classroom instruction. Total Motivation Math addresses all readiness and supporting student expectations of the Texas Essential Knowledge and Skills (TEKS) for grades 3-8, and addresses all student expectations for grades 1-2. This student and teacher resource is designed to improve students’ problem-solving capabilities. With units addressing each assessed student expectation, students are empowered to make connections between mathematics and everyday life. Total Motivation Math incorporates research-based strategies and pedagogically sound principles for teaching and learning. This mathematics product is designed to support and enhance the best practices for teaching the TEKS. Total Motivation Math is founded on the “Active Teaching” model, which is teacher-directed instruction that proceeds in small steps. Research indicates that this approach is associated with higher levels of student achievement. Students are guided through the learning process and are afforded multiple, varied opportunities for mastery of targeted student expectations.

Written to reflect the depth, rigor, and complexity of revised state assessments, Total Motivation Math complements existing mathematics curricula and can serve as a reinforcement or intervention. Total Motivation Math reflects deep alignment to the Texas Essential Knowledge and Skills (TEKS) and addresses National Council of Teachers of Mathematics process standards. The Teacher Edition includes hands-on instructional activities appropriate for variety in groupings (i.e., whole group, small group, partners, individual) and suggested interventions. Every standard at every level, whether eligible for testing or not, is addressed. Essential academic vocabulary, and children’s literature connections are also identified for the standards. In addition, manipulatives are woven into the instructional activities. Total Motivation Math for grades 1–5 is available in English and Spanish.

In 2012, the United States Department of Education and the Federal Communications Commission announced a blueprint to invite schools to transition to digital textbooks by the end of the next five years. While not mandated, the initiative encourages schools to make the switch from print-to-digital materials based on the projected cost-savings and the academic improvement. These benefits are due to the expense of printed textbooks and the personalization of digital content. Total Motivation Math features a print-to-online transition. Campuses will have online access to all the Student and Teacher Edition content if using Internet-connected computers. Using the same aligned content as Total Motivation Math, educators have access to an online delivery method for their students and classrooms. This new dimension of flexibility offers an alternate learning environment, not only for educators, but also for students. Tools such as online progress monitoring, automated scoring of selected-response items, tracking, and reporting are built into the online component of Total Motivation Math. Whether utilizing print and/or online formats, students can develop a deeper understanding of mathematics with Total Motivation Math.

Hiebert and Wearne (1992; 1993; 1996) reported that a critical attribute in regards to student learning in mathematics, is the nature of the learning task in which to engage students. Students need mental engagement in challenging and worthwhile mathematical tasks that emphasize the conceptual aspects of the topic and promote the formation of mathematical connections. This type engagement is a prerequisite to learning skills with meaning and being able to apply those skills to solve problems. Students must receive direct encouragement to think and persist with the mathematical task at hand.
Grouws and Cebulla (2000) stated that teaching mathematics with a focus on number sense encourages students to become problem solvers in a wide variety of situations and to view mathematics as a discipline in which thinking is important. “Number sense” is an intuitive feel for number size and combinations, as well as the ability to work flexibly with numbers in problem situations in order to make reasonable judgments. The processes of mentally computing, estimating, sensing number magnitudes, moving between representation systems for numbers, and judging the reasonableness of numerical results must be flexibly used. This type of instruction requires teachers to have a deep understanding of mathematics and how students learn mathematics. More specifically, teachers will encounter difficulty in teaching number sense without a working knowledge of number sense themselves.

The experiences, discussions, and review of the literature convinced the Mentoring Minds Product Development Team that resources for mathematics needed a change. Thus, the format for a Student Edition was designed to help move mathematics forward so that teachers could incorporate the teaching of TEKS in mathematics on a higher level and develop within students the confidence they need to succeed.

Student data from the Spring 2016 STAAR® Mathematics Summary Report (TEA, 2016a) demonstrated a range of scores for students in grades three through five. The total tested third grade students were 372,905. For the category Numerical Representations and Relationships, third graders answered 71% of items correctly or an average of 8.5 items out of 12; for Computations and Algebraic Relationships category, third graders answered 65% of items correctly or an average of 11.7 items out of 18; for Geometry and Measurement third graders answered 69% of items correctly or an average of 6.9 items out of 10; and for Data Analysis and Personal Financial Literacy, third graders answered 67% of items correctly or an average of 4.0 items out of 6. The total fourth grade students tested were 367,350. For the category Numerical Representations and Relationships, fourth graders answered 76% of items correctly or an average of 9.1 items out of 12; for Computations and Algebraic Relationships category, fourth graders answered 64% of items correctly or an average of 10.3 items out of 16; for Geometry and Measurement fourth graders answered 53% of items correctly or an average of 8.0 items out of 15; and for Data Analysis and Personal Financial Literacy, fourth graders answered 63% of items correctly or an average of 3.2 items out of 5. The total fifth grade students tested were 366,266. For the category Numerical Representations and Relationships, fifth graders answered 68% of items correctly or an average of 5.5 items out of 8; for Computations and Algebraic Relationships category, fifth graders answered 65% of items correctly or an average of 15.6 items out of 24; for Geometry and Measurement fifth graders answered 64% of items correctly or an average of 7.6 items out of 12; and for Data Analysis and Personal Financial Literacy, fifth graders answered 66% of items correctly or an average of 3.9 items out of 6.

Student data from the Spring 2016 STAAR® Reading Summary Report (TEA, 2016a) demonstrate a range of scores for students in grades six through eight. The total sixth grade students tested were 353,581. For the category Numerical Representations and Relationships, sixth graders answered 53% of items correctly or an average of 7.4 items out of 14; for Computations and Algebraic Relationships category, sixth graders answered 65% of items correctly or an average of 15.6 items out of 24; for Geometry and Measurement sixth graders answered 64% of items correctly or an average of 3.9 items out of 6; for Data Analysis and Personal Financial Literacy, sixth graders answered 66% of items correctly or an average of 3.9 items out of 6.
average of 7.6 items out of 12; and for Data Analysis and Personal Financial Literacy, sixth graders answered 66% of items correctly or an average of 3.9 items out of 6. The total seventh grade students tested were 329, 106. For the category Probability and Numerical Representations, seventh graders answered 57% of items correctly or an average of 5.1 items out of 9; for Computations and Algebraic Relationships category, seventh graders answered 61% of items correctly or an average of 12.2 items out of 20; for Geometry and Measurement seventh graders answered 51% of items correctly or an average of 8.2 items out of 16; and for Data Analysis and Personal Financial Literacy, seventh graders answered 66% of items correctly or an average of 3.9 items out of 6. The total seventh grade students tested were 329, 106. For the category Probability and Numerical Representations, seventh graders answered 51% of items correctly or an average of 8.2 items out of 16; and for Data Analysis and Personal Financial Literacy, seventh graders answered 66% of items correctly or an average of 3.9 items out of 6. The total eighth grade students tested were 295, 606. For the category Numerical Representations and Relationships, eighth graders answered 64% of items correctly or an average of 3.2 items out of 5; for Computations and Algebraic Relationships category, eighth graders answered 62% of items correctly or an average of 13.6 items out of 22; for Geometry and Measurement eighth graders answered 53% of items correctly or an average of 10.6 items out of 20; and for Data Analysis and Personal Financial Literacy, eighth graders answered 60% of items correctly or an average of 5.4 items out of 9.

Several reasons might account for the lower range results. In the 2014-2015 school year, new TEKS for mathematics were first implemented. The new TEKS were written with rigor, and many math concepts were moved to different grade levels. The assessment in 2016 represents the second year that the new TEKS for mathematics were assessed on STAAR, and some gaps in learning may still exist while instructional adjustments to a higher level of rigor are still in progress. As evidenced by these results, there appears to be a need for quality resources that support the implementation of effective teaching and learning for mathematics content skills and knowledge and well as mathematics processes. Total Motivation Math provides a wealth of resources that address all the mathematics content standards for a given grade level while integrating problem solving, critical thinking, and communication skills. Total Motivation Math provides opportunities for students to connect mathematics to the everyday world and to other content areas. Total Motivation Math offers instructional support in the form of formative assessment opportunities integrated throughout the instructional units, addressing all TEKS.

The Product Development Team for Total Motivation Math developed this resource to help students in Levels 1-8 achieve mastery of identified Readiness and Supporting Standards. In addition, Total Motivation Math is based on the Mathematics TEKS (TEA, 2014a), released sample test items (TEA, 2015), TEA STAAR® Blueprints (TEA, 2014b), STAAR® Mathematics Resources (TEA, 2014c; 2016), and information gleaned from conferences and individuals (Guthrie and Duncan, 2010; 2011). For Levels 1 and 2, students are provided learning experiences built around corresponding grade-specific standards. These experiences target the standards and provide repeated practice along with multiple opportunities to demonstrate learning, revealing progress toward mastery.

Eight pages of reinforcement is provided for each Student Expectation Levels 1-8; for each Supporting and Readiness Standards; and four pages of reinforcement. Each unit in Levels 1-5 includes the following components: Introduction, Guided Practice, Independent Practice, and Assessment, Critical Thinking, Vocabulary, Journal prompt, Motivation Station and Homework/Parent Activities, all which allow students to reflect and communicate their knowledge of mathematics. In Levels 6-8, all of the components are included with one exception: Homework/Parent Activities become Connections. According to Grouws and Cebulla (2000), students need to be given both an opportunity to discover and invent new knowledge and an opportunity to practice what they have learned to improve student achievement. Total Motivation Math presents multiple learning expe-
Numerous studies have indicated that increasing the amount of time spent in mathematics instruction is positively correlated with student achievement in mathematics. The 2001 National Research Council publication, "Adding It Up: Helping Children Learn Mathematics" stated that significant time should be devoted to daily mathematics instruction in every grade of elementary and middle school. In addition, the 1999 Handbook of Research on Improving Student Achievement (Cawelti, 1999) stated that a favorable relationship between total time allocated to mathematics and general student performance exists. A finding in The Nations’ Report Card: Mathematics 2000, NAEP showed that the average scores of fourth and eighth graders generally increased as the amount of instructional time for mathematics increased. Grouws and Cebulla (2000) also concluded in their work that a positive relationship existed between total time allocated to mathematics and general mathematics achievement. Furthermore, the way in which time is utilized in mathematics class can be paramount to the degree of student achievement. Additional time is recommended to be spent in direct instruction as opposed to seatwork or written drill. The 1999 TIMMS video study indicated that nations scoring higher than the United States on tests of mathematics achievement at grade 8 devoted more time on the average to studying new content (a range of 56 to 76% of lesson time) than reviewing previous content. In the United States, there was no detectable difference between the average percent of lesson time devoted to reviewing previous content and studying new content (52 and 48% of lesson time respectively). Total Motivation Math is arranged to allow teachers the flexibility in the allocation of time per component and/or per unit, pending the allocation of time requirements within the district or what is warranted by the needs of students, the intervention period cycle, or teacher discretion.

As the NCTM (2000) stated, “Assessment plays a critical role in all aspects of teaching and learning mathematics.” In the publication “What We Know About Mathematics, Teaching, and Learning” compiled from numerous writers, Nancy Kober (1996) from North Central Regional Educational Laboratory (NCREL) reported that evaluation tools which closely align with the objectives are usually more beneficial for diagnosing and revising instructional needs. Due to accountability issues, assessment is an essential component of Total Motivation Math. The assessment focuses on the tested expectation(s) from whence the teacher can gather timely student information to readily and continuously maintain accountability for academic achievement standards.

Many of the pages within the unit can serve as formative assessment opportunities. Formative assessment or assessment for learning is crucial in schools today, as it involves students in the learning process and points to the next steps to be taken by students to advance their learning. When assessment is an integral part of mathematics instruction, it contributes significantly to students’ mathematical learning (Stecker et al., 2005). Assessment should inform and guide teachers as they make instructional decisions. The tasks that teachers select for assessment convey messages to students about what kinds of mathematical knowledge and performance are valued. There are several pages in Total Motivation Math which could be used as formative assessments that are interwoven throughout each unit. Selected-response items and constructed-response items are contained in Levels 1-8 Student Editions. Introductory and Homework activities in Level 1 require hands-on activities using mat format. Observation of students as they manipulate and interact with materials provides
teachers with formative assessment data with which to adjust or adapt future instruction. Such activities also establish a foundation for the standard(s) being addressed in the unit. The Introduction in Levels 2-5 offers some open-ended format items. The provision of open-ended items allows teachers to use students’ responses to determine individual strengths and weaknesses and reasoning abilities. Teachers then have data to prescribe the depth of instruction and/or interventions required. Open-response questions are best practice classroom opportunities and have produced evidence showing positive effects in improving student performance. These types of questions provide teachers with opportunities to better understand current knowledge, thinking, and comprehension of the concept displayed by students. When students show their work, teachers are able to diagnose problems such as error patterns in computation and reasoning. Research shows that this is not easily possible with a selected-response format. In Levels 6-8, assessment items reflect selected-response and griddable items. Griddable questions are a type of open-ended questions used on all mathematic assessments that allow students opportunities to derive answers independently without the influence of answer choices. STAAR® reflects an increase in the number of griddable responses on STAAR®; Total Motivation Math features the same pattern for griddable items.

Journal prompts that are used in all Levels of Student Editions provide authentic writing opportunities and, as promoted by research, serve as a valuable instructional learning experience for concept application to real-world settings. Open-ended problems are presented for students to solve using words, numbers, or pictures, and to follow up with written explanations. Mathematical concept prompts allow students to reflect and communicate their knowledge of mathematics. The mathematics journal prompt asks students to apply some aspect of the concept to a real-world setting or to examine the concept in relation to personal experiences. Students think about the concept as it applies to their own lives and communicate their thinking using the language of mathematics. The journal prompts in Total Motivation Math serve as another formative assessment opportunity for students to express their thoughts and reasoning abilities as they transfer mathematical concepts across the disciplines, forming real-world connections.

Feedback from the variety of formative assessment tasks in Total Motivation Math helps students know how to improve and what next steps to take. Other benefits will be seen as students play prominent roles in setting goals, assume responsibility for their own learning, and become independent learners. Therefore, teachers can gather timely student information or data to readily and continuously maintain accountability for academic achievement standards in mathematics. Assessment for learning is a common occurrence within both Student and Teacher Editions so that teaching can be adjusted and learning can improve and grow. A Chart Your Success page is included in all levels 1-8 and is located in the back of each Student Edition for each student to visually record and follow ongoing progress. The Teacher Edition also features the Chart Your Success chart. The Assessment page used in conjunction with other measures can provide crucial information for the teacher in improving performance. Studies support the use of a variety of measures to gauge student achievement. Due to accountability, Mentoring Minds encourages teachers to maintain accurate and useful data as well as use a variety of assessment measures to form a more valid insight on where a campus, classroom, or student stands in the area of mathematical performance. Effective and high-quality instruction is a result of using data to make informed decisions.

Critical thinking is an important issue in education today. Attention is focused on quality thinking as an important element of life success (Huitt, 1998; Thomas and Smoot, 1994). In the 1950s, Bloom found that 95% of the test questions developed to assess student learning required them only to
think at the lowest level of learning, the recall of information. Similar findings indicated an over-emphasis on lower-level questions and activities with little emphasis on the development of students’ thinking skills (Risner, Skeel, and Nicholson, 1992). As Hobgood, Thibault, and Walberg (2005) pointed out, “Now, a considerable amount of attention is given to students’ abilities to think critically about what they do.” It is imperative for students to communicate their mathematical thinking coherently and clearly to peers, teachers, and others.

When solving mathematical equations, it is crucial to invite students to explain their thought processes. If the results are inaccurate, teachers can identify the precise point at which students deviated from using critical thinking. Thus, it is essential that classrooms promote critical thinking as part of the learning experiences in mathematics. The literature noted that when students use their critical thinking abilities integrated with content instruction, depth of knowledge can result. Teachers are encouraged to refrain from limiting instruction to lectures, rote memorization, and other strategies that exercise only lower levels of thought as opposed to incorporating those that build conceptual understanding (Bransford, Brown, & Cocking, 2000).

The model used to structure critical thinking throughout Levels 3-8 of the Student and Teacher Editions is Bloom’s Taxonomy (1956). The models used to develop critical thinking throughout Levels 1-2 Student and Teacher Editions are: Bloom’s Taxonomy (1956), Revised Bloom’s Taxonomy (Anderson et al, 2001), and Webb’s Depth of Knowledge (2002). These cognitive models were used by the product developers to stimulate and develop students’ higher order thinking skills and make extensions to the real world.

Critical thinking is embedded in each component of the unit through higher-order questions and complex problematic situations. For Levels 1-8, the one-page Critical Thinking section is presented to entice students to think critically and move them beyond basic comprehension and rote memorization. This page typically offers two open-ended questions that are coded to higher levels of Bloom’s. For Levels 1-2, the coding is tied to Bloom’s and to Depth of Knowledge levels. While students are applying and using higher order thinking skills in real-life situations, they are also learning to question the accuracy of their solutions. The Critical Thinking pages or questions ask students to explain how answers were determined or to justify individual reasoning. In every unit at all 1-5 levels, the Critical Thinking pages include one or two problem solving situations, generally coded to the application, analysis, or synthesis levels. Students are not only required to solve problems, but are directed to explain their reasoning. This type of thinking gives teachers further insight into student thinking processes in mathematics. Journal prompts also offer authentic writing opportunities that invite critical thought and serve as valuable instructional evidence-based learning experiences for concept application to real-world settings. When teachers understand errors or misconceptions in student thinking, then they are better able to refine instruction to match student needs.

Open-ended problems are presented for students to solve using words, numbers, or pictures, and to follow up with written explanations.

A basic characteristic needed to become a proficient problem solver is flexibility. Flexibility develops through the expansion of knowledge required for solving nonroutine problems rather than just routine problems. Nonroutine problems (those not familiar to the problem solver) and transfer of problem solving require high level transfer, which is effortful and conscious (Salomon & Perkins, 1989), whereas routine problems involve less conscious attention and rely more on low level
transfer. Routine problems are those in which the learner knows a correct solution method based on past experience and is able to reproduce it and apply it. Caution, given by experts, is that students can lose the ability to articulate and reflect on the reasoning they use in solving problems if they are exposed to mostly routine problems. Nonroutine problems require the learner to use productive thinking to create a way to understand and solve the problem since an immediate solution method is not known. A balance is needed between the time students spend practicing routine procedures and the time they devote to discovering new method solutions for nonroutine problems. There is no need for teachers to make a choice between which of these two type problems to use if students are to develop mathematical thinking power. Assessing the work of students in a problem-solving situation differs from a traditional method of determining the accuracy of computational skills. Open-ended problems can be solved using a variety of methods or the problems can have multiple responses. Total Motivation Math utilizes a variety of assessment opportunities.

Two sections, Homework and Parent Activities, are located at the conclusion of each unit in the Student Edition of Levels 1–5. In Levels 6–8, Connections activities conclude each unit in the Student Edition. Total Motivation Math includes these activities to invite and encourage parent engagement in mathematics education. Product developers recognize that teachers must support and encourage parent collaboration with students regarding mathematics. Teachers are provided activities per unit with which to cultivate parent involvement with their children by reinforcing previously introduced skills. The Connections activities in Levels 6-8 may be completed at home but they also may be used as additional instructional activities. Research concludes that productive collaboration and interaction with parents have a favorable impact on attitudes towards mathematics and student achievement (Calabrese Barton et al., 2004). Parents can be significant contributors to the learning process. Opportunities for parents to be involved in their students’ learning allow parents to show an interest in the students’ work. Parent involvement helps parents become familiar with the content and the way students are learning (National Council of Teachers of Mathematics, 2000). When parents take time to provide home encouragement, students have another opportunity to apply and practice the mathematical concepts previously learned. Teachers and other educational leaders should consistently help students and parents to understand that an increased emphasis on the importance of effort is related to improved mathematics performance (The National Mathematics Advisory Panel, 2008).

Research indicates that the more parents are excited and involved in the learning of their children, the more successful a child can be academically. When schools cultivate partnerships and engage families in their children’s education, author Constantino (2008) stated that student achievement can increase. In addition, Constantino noted that schools must continuously nurture relationships with parents by providing them with resources to help their children succeed in school. Constant attention in strengthening relationships lays the foundation for high-quality engagement. West (1985) and Weller (1999) indicated that there are parent behaviors that can lead to effective schools. When parents show support and interest and become involved, the success rate of students can rise. Students in at-risk situations show an increase in grades, test scores, and academics when their parents become involved in instructional programs (Dolan, 1996). The activities for parents in Total Motivation Math offer opportunities within each unit to reach and engage parents.

Bagin and Gallagher (2001) noted that communicating on a regular basis with parents can promote student learning and reduce attendance problems. Weller (1999) advocated that when schools and teachers treat parents with genuine concern and make them feel important, welcome, and needed, parents are more apt to take...
active roles in supporting their children in academic achievement. Findings from an extensive research review on parent/family involvement programs were shared by Henderson and Mapp (2002) in the report *A New Wave of Evidence: The Impact of School, Family, and Community Connections on Student Achievement*. Henderson and Mapp concurred with other researchers that a favorable and substantiated relationship exists between family involvement and student success, regardless of race/ethnicity, class, or parents’ level of education. A key finding is that children of parents who are involved in home and in school settings show improved performance in school. Thus, the sections Homework and Parent Activities are provided to help parents support their children with meaningful and relevant applications to the previously taught concepts. The information given helps the parent and child build oral language through informal conversation. Simply written, the text invites parents to support the mathematical learning by asking questions, making relevant comments, or setting up other home learning activities to reinforce previously introduced concepts. Assignments, intended to be completed in class or at home, enhance students’ understanding, skills, and proficiency in mathematics.

Levels 3-8 Teacher Editions list the STAAR® Reporting Categories and Content and Process TEKS for each unit in the Student Edition. Suggested activities and interventions based on the Content TEKS for each of the units are located in 1-8 Teacher Editions. They are coded to the English Language Proficiency Standards (ELPS). Answer keys and vocabulary for each lesson are also included.

Research findings have indicated that certain teaching strategies and methods are worth careful consideration as teachers strive to improve their mathematics instruction. Stigler and Hiebert (2004) predicted that, when the improvement of teaching methods becomes the focus, student performance will show more positive results. Teacher and student interaction is key to improvement. Many students learn mathematical concepts best through the manipulation of concrete materials because it helps them to build a mental representation of the concept. Manipulatives provide concrete introductions to abstract ideas. Every student should have an opportunity to have adequate “hands on” experiences with appropriate manipulatives before engaging in pencil-and-paper activities. Textbooks and other printed resources show the pictorial and symbolic representations of mathematical concepts.

According to several studies, the use of manipulatives can enhance the cognitive process. Suydam and Higgins (1977) researched activity-based teaching approaches, including the use of manipulatives, in kindergarten through eighth grades. The conclusion reported was that “lessons using manipulative materials have a higher probability of producing greater mathematical achievement than do non-manipulative lessons.” Findings revealed that manipulatives are effective no matter the achievement, ability, or socioeconomic levels of students. Manipulatives and pictorial representations produce higher achievement as opposed to only symbolic representations, as students can construct models to show their understanding of mathematical ideas or processes. This allows teachers to observe how students think or reason so that misconceptions can be corrected in a timely manner. It also offers students opportunities to demonstrate their learning other than with paper and pencil. The relationship between longevity and the use of manipulatives indicates positive findings of enjoyment, interest, and understanding, thus increasing student engagement in mathematics (Ruzic & O’Connell, 2001; Sowell, 1989). When students’ interest grows, mathematical ability is
affected and attitudes towards mathematics improve. Sutton and Krueger (2002) reported that long-term usage of concrete materials seems to be positively related to increases in mathematical ability. Research by Grouws and Cebulla (2000) suggested that teachers use manipulative materials regularly in order to give students hands-on experiences in order to construct meaning for the mathematical ideas they are learning. A major benefit for students would be to use multiple types of manipulatives when learning mathematical concepts to ensure broader comprehension.

In *Curriculum and Evaluation Standards for School Mathematics*, the National Council of Teachers of Mathematics (NCTM, 1989) recommended the use of manipulatives in math education especially for elementary levels. In the revised document, *Principles and Standards for School Mathematics*, NCTM (2000) continued to place emphasis on the importance of manipulatives and supports the use of manipulatives in mathematics instruction. Although studies report there is no one way to best teach mathematics, the use of manipulatives combined with other strategies can cultivate depth and understanding of abstract concepts. Total Motivation Math does not limit the use of concrete materials to demonstrations, but suggests ways that encourage students to think and verbalize their thoughts.

Every student should have an opportunity to have adequate “hands on” experiences with appropriate manipulatives before engaging in pencil-and-paper activities. Textbooks and other printed resources show the pictorial and symbolic representations of mathematical concepts. It is highly recommended that every classroom have an assortment of manipulatives for student accessibility at all times. If the same materials can be used to teach multiple ideas during each school year, then the amount of time to introduce the manipulatives can be shortened and students are helped to visualize and establish connections between ideas. This does not preclude a teacher from introducing other manipulatives but provides consistency with essential manipulatives utilized at more than one grade level. Thus, research and mathematical experts agree that the one essential component in a mathematics program should be the appropriate use of manipulatives. The use of concrete materials should not be limited to demonstrations. It is essential that students use materials in meaningful ways rather than in a fixed and restricted way that focuses on recall rather than on thought. Thus, Total Motivation Math supports the use of manipulatives and identifies manipulative-based activities throughout the Teacher Edition to accompany student addressed expectations.

Suggested literature that can be used for integrating lessons across the curriculum is noted in the Teacher’s Edition. For Levels 1-5, literature selections are listed to help students make connections. Levels 6-8 literature selections are addressed within the activities. Children’s literature offers excellent resources for connecting literature to mathematics instruction for students. As the National Council of Teachers of Mathematics (1989) pointed out, “Through the use of books, students see mathematics as a form of communication. It has been proven that children learn best when they can apply their learned knowledge from one subject to another.” Problems that emerge from books make the mathematics relevant, are exceedingly motivational, and present meaningful contexts for establishing mathematical thinking.

Literature can stimulate a variety of creative and critical thinking responses from the students, such as performing a skit from the story followed by mathematics-related problems. Problem-solving strategies, including acting it out, drawing a picture, and constructing a model using manipulatives, materialize quite readily from this type of activity. Evidence has shown that books encourage thinking and reasoning in mathematics when questions are presented on higher thinking levels. Discussions are encouraged to build conceptual understanding. Thaiss (1986) advocated a mathematics and literature connection to strengthen student motivation and increase
higher levels of engagement. Becoming a Nation of Readers: The Report of the Commission on Reading (1985) stressed the importance of the integration of reading. Mathematics lends itself easily as a communication tool and thus, works directly with reading to help students become successful learners.

The sections Activities and Interventions contain learning experiences that teachers may incorporate during instruction to teach and reinforce the concepts found in the Student Edition, providing direct focused instruction. Activities are explicitly employed to develop skills and mathematical conceptual understandings accenting the focused TEK and other related TEKS. Many of these activities are hands-on and require some type of manipulative. Often, the activities are at the concrete or pictorial levels to allow students to form connections. When students lack comprehension and are found to be in need of additional small group instructional interventions, then the experiences in the section Interventions are readily available. The Intervention activities are targeted to prerequisite concepts. They always present alternative methods of teaching a foundational skill necessary for mastery of a concept. Active instruction includes a wide range of instructional approaches: small groups, class discussion, concrete objects, hands-on experiences, reading, and writing. In Total Motivation Math, teachers can ask students to think aloud, consider different options for solving problems, show evidence for the solution reached, and put their thoughts in writing. All of these ways help students to organize their thinking and assist teachers in determining the level of understanding of mathematical concepts. Studies have indicated that instruction which emphasizes active student engagement in hands-on opportunities improves attitudes toward math and indicates a positive effect on mathematics achievement. Evidence from previously mentioned research demonstrates that a successful mathematics program must include time for students to practice what they are learning and experiences to perform the tasks for which they are to demonstrate competence. The additional Activities and Interventions in Total Motivation Math Teacher Editions support students in their quest for mastery of the standards as a useful tool in the general education classroom and as a resource for tiered interventions settings.

The Activities or Interventions also target vocabulary to make learning meaningful, fun, and interesting. Students have to understand vocabulary to understand the academic content they encounter in school. Stahl and Fairbanks (1986) revealed that when specific vocabulary from academic subject areas was selected as the focus of instruction, the result was a 33% increase. Therefore, it appears that when students are taught specific academic vocabulary in each subject area at each grade level, students have an excellent opportunity to acquire the academic background knowledge they need to understand the subject area content. Teaching content vocabulary using a systematic approach appears to be a powerful tool for student success (Marzano & Pickering, 2005). Furthermore, research has firmly documented that academic background knowledge has an effect on academic achievement. Any intervention for the achievement of students should identify increasing students’ content vocabulary knowledge through direct instruction as a leading priority (Marzano, 2004). While the vocabulary is merely identified for each unit at all levels, some of the suggested teaching activities and the suggested children’s literature integrate vocabulary within instruction.

Mentoring Minds seeks to understand the issues involved in teaching and learning mathematics. The National Research Council (2001) asserted that the performance of students in both reading
and math at the conclusion of elementary school is an important predictor of their educational success. Students who have not mastered certain basic skills can expect to encounter problems in mathematics throughout their schooling and later. Summary statements such as these, other research findings, a review of mathematical literature, combined with recommendations from studies and observations from classroom experiences have yielded much knowledge about what works. With this wealth of information, Total Motivation Math was developed to serve as a complement to an existing mathematics program for any grade or campus. The Mentoring Minds Product Development Team embraces the goal that all students receive a quality mathematics education.

The content of Total Motivation Math focuses on the STAAR® Reporting Categories and the student expectations in the TEKS, ensuring that the product is appropriate, high-quality, and up-to-date. Frameworks for critical thinking help form questions and/or learning activities that stimulate and develop students’ higher order thinking skills. Examples of research-based techniques applied in the development of Total Motivation Math include standards-based instruction, active teaching, hands-on instruction, critical thinking, and formative assessment. The literature on improving student performance in mathematics has concluded that effective mathematics programs provide specific information on individual student performance for teachers, parents, and students; peer feedback and support; direct or explicit instruction; and real-world problems. Total Motivation Math meets these criteria for improving student performance.

Bibliography for Total Motivation Math


