



Math 5th - HSEE Evaluation

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Evaluation of Classworks and Texas Mathematics



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Overview

The following evaluation of Classworks was undertaken to address concerns with high school level achievement in mathematics in Texas, particularly student performance on the Texas Assessment of Knowledge and Skills (TAKS). Issues with mathematics instruction in Texas, addressing the achievement gap, and the need for effective remediation are the basis for the evaluation of Classworks as an appropriate instructional solution.

Evaluator's Credentials

Jessica Tyler is a math educator with over 10 years of experience in the field of teaching and learning. She is a graduate of Peabody College at Vanderbilt University, where she earned a Bachelor of Science in Mathematics and Secondary Education with a minor in Psychology. Jessica taught Algebra I, Geometry, Functions, Statistics & Trigonometry as well as taught independent studies in AP Calculus and AP Statistics at the prestigious Saint Andrew's School, in Boca Raton, Florida. She also taught remedial Algebra I in the Keller ISD in Keller, Texas. Jessica earned a Master of Education in Educational Leadership at Florida Atlantic University before becoming an assistant principal, where she focused on curriculum and instruction for all subject areas. Her innovative and successful programs in that position led to her doing district-wide math training and development with teachers from all over the district. She is currently an educational consultant with Educational Consulting Services while she is enrolled full-time in a dual degree program at Texas Christian University in Fort Worth, Texas. She is working on a Master of Business Administration and Doctor of Education in Educational Leadership. This fall she is teaching an upper-level math methods course for the College of Education at TCU to help prepare pre-service teachers for their role as math educators. As a consultant, Jessica develops tailored tutorial programs for schools, trains teachers on instructional methods, analyzes TAKS data and devises plans for schools, coaches math and other content area instructors one-on-one, and develops trainings for and presents to principals and other administrators regarding TAKS.



Frequently Asked Questions

Who is the target and what problem is Classworks designed to help solve?

Classworks is designed to provide instructional support in Texas classrooms for students who need remediation on the state test as based on the Student Expectations of the TEKS. Although this remediation program is supplemental to other instructional methods that are used in math classrooms, it is designed to be comprehensively aligned to the state curriculum standards.

Does Classworks help solve this problem in the following adequacies: instructional methods, curriculum, and format?

Classworks is the most comprehensive, well designed math software program on the market. It offers a vast array of engaging lessons, activities, projects, and assessments that are tightly aligned to the state curriculum. It is well structured and very organized, offering useful teacher tools such as reports, tracking mechanisms, and curriculum alignment formats that make keeping up with student remediation programs more efficient and ultimately more effective.

The program devises an individual plan for each student based on TAKS results from the prior year. The student works through their own personal plan in an autonomous manner which allows for varying levels of teacher involvement. The exercises are extensive, varied and also allow students to practice their skills in multiple formats, which keeps them engaged. The program offers projects that extend learning for all students and can be used as enrichment or as a culminating activity.

The pre-tests and post-tests (9th – 11th) and mini-lessons and quizzes (5th – 8th) included in most units, provide a level of consistency throughout the program that contribute to the continuity necessary in such a comprehensive program. The program runs flawlessly and utilizes high-tech graphics and sound. All activities are developmentally appropriate and designed, most importantly, with the student in mind.



Instructional

Does Classworks contribute in a positive way to the learners' knowledge, skills, and attitude?

Every aspect of Classworks contributes in a positive way to learners' knowledge, skills and attitude in mathematics. Students' knowledge and skills are improved because of the thoroughness of the alignment, the extensiveness of the activities and through the well-designed mini-lessons and student practice sessions.

Does Classworks provide learning experiences in a way which is efficient and effective for the learner and teacher?

As a supplement to other instructional methods, Classworks provides a very effective component to an overall well-formed remediation plan. Classworks is designed to save teachers time with multiple record keeping summaries and reports. The teacher tools allow instructors to be efficient with their time in setting up, recording and analyzing data for individuals as well as class groups. The learning experience can be judged effective by the teacher through these tools for each unit, each activity, and each assessment. This thorough feedback provides, for both the teacher and student, assistance in continually identifying students' deficits, better enabling the teacher and the student to be more efficient and effective in the learning process.

Does it allow for varied approaches to learning?

Varied approaches to learning cannot be mistaken for varied activities or varied "looks". Different modes of delivery for example are auditory, textual, visual, tactile, etc. For the most part Classworks' units present material in a text format where the student must read the material carefully in order to take in the information. Reading is an ineffective method for learning mathematics for most people, especially for low achieving students. There is a strong correlation between students that are not successful on the math state assessment and low reading skills. Text combined with voice explanations and visuals that *show* how to do the math would be the best combination for a computer based math program.

Throughout the program visuals serve as simple representations of certain math concepts (i.e. a picture of a triangle) or serve to improve the aesthetic appeal. In math instruction it is very important to use visual aids to *show* the math concept while explaining it verbally. For example, when teaching area of a polygon that is made of multiple shapes – such as a house-shaped 2-D figure – it would be beneficial to show on the screen the rectangle and the triangle – visually break up the figure with action and color to show how to approach the problem while a voice also explains the process. Throughout Classworks, there are several activities that combine visuals and text but there are few that combine movement or action with visuals, text, and voice. Because students are on a computer, they cannot physically or in a tactile way grasp a concept unless the teacher supplements the program with manipulatives or other activities that capture those learning modalities. For this reason, it is very important to include voice explanations. Very few students learn by reading math, they must hear, see, and do math, often applying

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multiple methods. Because this program is designed to help students who need remediation, it is safe to assume that traditional methods did not meet their needs. So, if students are to improve their skills and hence their chances of mastering the state curriculum, it is extremely crucial to consider the instructional methods and modes of delivery within the computer application.

Are the activities, lessons, etc. motivating?

Every aspect of the Classworks program is highly motivating for students. Positive feedback, variability among activities and interactive presentation help keep students engaged. Many of the activities have a competitive angle that motivates students to want to learn the skill at hand. The activities, including mini-lessons and quizzes, are interactive and work at building the learners' confidence (a very important aspect to remediation).

Are prompts provided explaining misunderstandings?

Most activities provide explanations when an incorrect answer is given and some of the best programs prompt the learner with hints of things to think about as they try again. Hints and options to get help allow students to remain independent as they work through the lessons.

Are learners asked for various kinds of input?

Students provide multiple kinds of input. For example they click and drag things into Venn-diagrams, answer multiple-choice questions, classify objects, and point and click on the Cartesian plane.

Are correct answers reinforced with positive feedback?

Yes, but mostly just sound. Opportunity exists for more reinforcement of skills through other means than a simple bell or bonk. Some of the best activities keep score or award points that help set goals for students. Once a certain level is attained students are rewarded with a fun activity, only after success on the skills has been reinforced.

Are correct answers provided or explained?

Yes, in most activities correct answers and an explanation are offered. However there is room for improvement on this dimension because some activities provide the correct answer and quickly move on to the next problem without any conceptual explanation or recap of the skills required for the activity.

Does the program evaluate the student answer or identify their misunderstandings?

The best activities provide hints or an analysis of students' misunderstandings. For example, the activities with the green dinosaur provide an "analyze" button that students can click on to see what they missed and why. These explanations are very instructional and provide great reinforcement for the learner. The only draw back is that students do not have to click on it before progressing. If students are prompted with the analysis screen as a pop-up, it will ensure they view these helpful explanations.

Is the student encouraged to obtain the correct answer or try again?



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For most programs, students are given multiple chances to answer a problem correctly. There are, however, a few activities that only allow one chance and then give the correct answer. Hints when a first or second try is incorrect would be helpful to learners and would provide yet another attempt to instruct or help the student gain understanding.

Does the program recommend special remediation to the students as a response to the outcome of certain activities?

No, this is another opportunity for growth. Depending on the progress of the student, an adjusted plan for instruction could be suggested or designed.

Does the program/activity provide an indication of how the student is proceeding periodically?

At all times, the student is able to click on a “results” button to view their own progress on activities as well as mastery, percent correct and time on task. The teacher has immediate access to individual and group progress which contributes to the efficiency and effectiveness of the overall remediation program.

Is the feedback on errors instructive and motivating – leading to the student to want to try again?

As mentioned previously, most activities provide instruction when errors occur, but only after a student misses for the last time. For instance a child picks A, not right, then B, not right, then a screen appears giving the correct answer and an explanation of the problem. A more motivating method is to provide hints along the way – mathematical hints – not “make sure you think about your solution before you choose.” Hints along the way will encourage students because they get a chance to “get it right” on their own before being shown how to do the problem – providing another opportunity to build confidence.

Is the program compatible with the age and capacity of the learner?

Yes, the developmental level is appropriate throughout all levels of the program. Classworks does an outstanding job of choosing activities that are age appropriate and at the proper level of difficulty with regard to mathematical concepts. Some opportunity exists to develop skills to a higher level of thinking, particularly in 5th – 8th grade.



Curriculum

How do the skill building activities, lessons, projects, etc align with the TEKS and Student Expectations as related to the TAKS test?

The alignment of Classworks is impressive. For the most part, the alignment is thorough and appropriate. There are some areas that need improvement, for instance some Student Expectations that are eligible for testing are not addressed and some Student Expectations are not supported appropriately or completely by the chosen units/activities. These instances are limited and are specifically noted in the appendices.

Can the student apply what they learned to TAKS type questions?

For 5th – 8th grade there is a general gap in the skills practiced through Classworks and the skills required to master concepts on the TAKS test. Students who work through the lessons and activities successfully will be better prepared for TAKS, but mastery of the TAKS objectives may still be out of reach.

However, for 9th – 11th grade there is a genuine parallel between the skills practiced through Classworks and the skills required to master concepts on the TAKS test. Students that successfully complete remediation through Classworks will be well prepared to master the

objectives of the TAKS test. The alignment is tighter and the type of practice is more appropriate, mirroring the types of questions on the test. The bold phrases on the 9th – 11th TAKS Findings must be addressed to improve alignment.

Do the exercises address higher-order thinking skills in a way that will prepare students for TAKS type questions?

For 5th – 8th there appears to be a lack of developing a skill to the application or contextual level. When looking at the TAKS test for these grade levels, most test questions are contextual and require students to recognize the necessary skills on their own in order to solve the problem. In remediation it is important to *build* a concept up to that level so that students will have experience with a skill in several different applicable situations. Students that struggle with reading, and hence math problems, mostly struggle with recognition of basic math concepts when they are within any context different from that in which they learned the skill. This is why it is very important to develop skills up to a contextual level for all students.

Does Classworks link concepts in a meaningful sequence?

The consistency in the mini-lessons, quizzes, pre-tests and post-tests provide continuity among units. This approach contributes to the overall successful sequencing of activities. Within units, sequencing is appropriate to state-wide curriculum progression in mathematics.

Can more challenging options be selected?



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The projects provide an excellent opportunity for extension for all students. In addition to projects, the best activities allow the student to click a “harder” button to increase the level of difficulty.

Is the pace appropriate?

The pace of the lessons and practice sessions is appropriate at all levels. Students set their own pace, allowing them to work at a rate that is personally comfortable and appropriate.

Is the difficulty appropriate?

The level of difficulty in terms of age/grade appropriateness is suitable in all activities. There are only two activities that may be too difficult – 6th grade unit 042 the first activity and 041 all of the Fuzzy Fracs activities. As mentioned before, the only suggestion is to incorporate higher-order thinking skills in a contextual or application type problem once basic skills have been practiced and mastered.

Format

Is the format easy to read and follow – not too busy or complex?

The format of Classworks as a whole is very easy to follow and navigate. The organization and structure make the program very user-friendly. Within the activities, there are a few modules

with lessons that are too busy and visually confusing or unappealing. For example, all Great Wave maze activities, 6th grade 020 activity #2 the little cone with the big sphere eyes and similar activities, 6th grade 033 activity #4 and all other activities like this (bread store, milk, pie), and 10th grade unit 007 activity R6 and all similar activities.

The best modules include “Math Deluxe Shop” activities, the Algebra I, Geometry, and Probability tutorials, Summit activities, the green dinosaur activities as well as many others.

Do the graphics make information more attractive?

Yes, for the most part the graphics help make the presentation of the material more aesthetic to learners.

Are visuals used as an instructional tool – do they aid understanding?

Except for the most obvious concepts that lend themselves to visuals (3-D shapes, graphing equations), most activities do not use visual aids as an instructional method. Meaning, the lessons do not use action with visuals and do not use models to *show* a mathematical concept. Opportunity exists to improve the use of visual models within all lessons and practice as part of an overarching instructional methodology.

Is information organized and structured in a way that helps the learner make sense of the information?

All activities are very organized, structured and easy for any student to follow. Text and graphics are organized in such a way that contributes to student understanding.

Does the use of animation motivate?

Many applications successfully use moving images to motivate. For example, the talking dinosaur, the talking head on the space ship, and those that reward progress with a game all use animation to keep the student engaged. Some activities use no animation at all and are less engaging, with little to no sound or action. For instance, 8th grade all activities in Unit 010. These are good practice problems, but less interactive comparatively.

Does the sound add to the understanding of the concept or is it a distraction?

The sound is primarily used to signal correct/incorrect answers, transitions between screens, or as background music. There is a great opportunity to use sound/voice in an instructional manner. For example, some activities have a voice explaining the steps involved in solving a particular



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problem. The activities that use voice explanations are the exception, as most activities are void of any use of speaking as an instructional aid.

Are the instructions clear and easy to understand?

The instructions are clear, concise, and age appropriate. Having clear instructions also contributes to the overall independence of the learner.

Did the program run without flaws or glitches?

For such a comprehensive program, it is remarkable that out of all of the navigating and opening and closing, not a single glitch occurs. All activities load quickly and flawlessly.



Integrating Classworks into math instruction

It is time to face reality about mathematics education in the state of Texas. Mathematics scores on the TAKS test are mediocre at best. The table provided on page five shows the state results and as you can see, the trend does not support the fact that great things are going on in Texas math classrooms everyday.

What the information does reveal is that there is a gap between how we teach and how our students are being assessed - a big gap. This gap must be addressed, because after all, our kids are the ones held accountable. Also, let me remind you that meeting the standard on the TAKS test may only mean that a child is successful on 40% of the test. For instance, in 11th grade on the Exit Exam, students only need to get 24 questions out of 60 correct (40%) to meet the standard. In 5th grade students only need to get 27 questions out of 44 correct (61%) to meet the standard. 61% is the highest percentage expected in order for students to meet the standard for the math test for 5th – 11th grade.

If you evaluate the data from the table, you will see some common themes. Among other concepts, our kids have a hard time with measurement concepts, problem-solving, algebraic reasoning and functions. The deficits with these concepts seem easy enough to combat for the common math teacher, but the data shows we are losing the battle. Math teachers do not have the luxury of looking at generalities or the big picture. We must look at each face, each day and know that we are a part of each student's success. We are a part of whether or not they will eventually be promoted and finally receive that high school diploma. The standards, the accountability, and the test (some form of a test) are all here to stay. It may not be called TAKS a few years from now, but the concept will be the same – assess what our kids should know – find out what they know – and use the data to make sure every child has the skills they need to be a functioning, productive member of society and the workforce.

How are we as math teachers supposed to manage the remediation of *all* students?

Each student has different strengths, different weaknesses and different learning styles. One lesson does not fit all. One approach does not fit all. One method does not fit all. In order to meet the accountability demands, teachers must devise individual programs so that students can work their own plan of remediation. Multiple individualized plans in today's diverse classrooms, an overwhelming concept, are the only avenue to ensuring academic success for each child. This is where Classworks, a program that helps teachers manage this massive process, comes into the picture. Classworks is a comprehensive program that is tightly aligned to the TEKS/Student Expectations and is directly connected to an individual student's TAKS data. It is not just another software program that has some practice sessions; it is a massive set of activities that vary in style, approach, and presentation. These activities support units that are



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grouped together and aligned with particular Student Expectations from the state curriculum. The activities allow students to be independent, working through their individual plan as outlined by the program. Students experience a pre-test or mini-lesson, engage in a variety of skill building activities and then are given a quiz or post-test at the end of each unit. Meanwhile, the teacher and student can track, record, and analyze the efficacy of the learners' sessions. Classworks manages the entire process. The teacher can be as involved or hands-off as necessary.

How do we fit Classworks into our overall math instruction within the classroom?

Integration of Classworks into our math instruction can be as varied as the program itself. Depending on the availability of computers, teachers may have to get creative. Access to a full computer lab is ideal, but is not prevalent in today's schools. Therefore, a teacher may have to make do with just three or four computers. I have seen teachers make mini-labs by combining several of their own computers in a central place and sharing the remaining computers among themselves for their own work. A creative solution like this may be all you need in order to provide students with ample time on Classworks. Listed below are just a few options for integrating Classworks into math classrooms.

Limited Computers

As mentioned above, three or four computers are all that is necessary to create a mini-lab. Cooperation among math teachers can benefit not only teachers, but more importantly students. The following arrangements are ideal for classrooms that have limited computers.

During math instruction that involves groups, a rotation can be set up so that students cycle through a center dedicated to Classworks. It may take a couple of days to cycle each group through the center so that they all have an opportunity to work on building their skills, but with simple planning this is a viable option.

During math instruction that allows independent work, a rotation can be set up so that students cycle through to the available computers. Planning a schedule so that each student rotates through with at least 15-20 minutes each session (assuming there is more than one computer), means you could feasibly get every child through at least once per week.

Lessons that involve students working in "centers" are a perfect opportunity to integrate a center that involves students working on Classworks. The Classworks center can be

incorporated seamlessly into any lesson, on any concept, and can be utilized throughout the year in this manner.



Content Mastery rooms almost always have three or four computers that are available for student use as outlined in their individual education plans. This is yet another opportunity for students that struggle in mathematics to practice their skills independently. While in CM for math help, time can be allotted for students to practice the skills related to the current lesson. The math teacher can communicate with the CM teacher what units should be assigned to parallel certain concepts. Or students could simply work their own designated plan in regular succession as part of their routine visits to CM.

Computer Labs

If a computer lab is available, teachers have several different options on how to integrate Classworks into their regular schedule, a few are suggested below:

Teachers can set aside a certain day(s) each week where students all work on Classworks at the same time. For instance, once per week (or even daily) the entire class can visit the computer lab for 30 – 45 minutes to “work their own plans.” This would be ideal in both block schedule 90 minute classes as well as traditional 45 – 55 minute class periods. Because a teacher can adjust a given student plan, even students that passed the TAKS can be assigned units based on their areas of struggle. Remember, just because a student passed, does not mean they have refined math skills. They may have only passed, percentage wise, a little over half the questions on the TAKS test. Even for the highest achieving students, this time can be used for enrichment and extension through the use of the Classworks projects.

This same concept can be applied at the beginning of each class period, during warm-up time. Teachers can meet the class in a computer lab at the beginning of math time. This can occur daily or once or twice per week. This time can be used to allow 15-20 minutes for students to “work their own plans.” This should allow enough time for a unit or two of quality practice. Doing this consistently throughout the year, will allow students the time they need to hone their skills.

COWs – Computers on wheels are used in many schools thanks to special grants. Laptops are arranged on carts and can be moved from classroom to classroom on a check-out basis. COWs can be utilized in the same manner as a computer lab, but teachers will have the added benefit of being in their own classrooms.



Tutorial Sessions

Because of the promotional demands, schools have been forced to get creative with tutorial programs. As part of an overall tutoring session, students can “work their own plans” on Classworks before or after school, during a “study” or homeroom time, or even in a pull-out program. Saturday sessions have even been implemented in many schools and what better way to engage students in a Saturday session than an interactive program like Classworks.

Other creative solutions are possible, it simply takes thinking about the kids that you have, the time that you have, the resources that you can gather, and how all of these can be arranged to give kids access to the support they need through Classworks.

In summary, one of the most important aspects of Classworks is student autonomy. All of the above examples of how to integrate Classworks into math instruction have one thing in common – they free up the teacher to be the facilitator. Because of the powerful management aspects of Classworks, teachers will have time to address the *individual* needs of students. Teachers can actually be available to help guide students, give additional instruction and employ inquiry techniques while students work on Classworks’ activities. A good remediation plan drills down to the individual level, designing instruction that meets each and every student’s needs and Classworks helps teachers do just that – it helps teachers see each face, each day and helps them manage each student’s progress toward achieving math success. Classworks makes it possible for teachers to individualize their remedial instruction, what once was an unattainable ideal.



Summary of State-Wide Performance on the Math TAKS

Grade	% Met Standard	Three Lowest Objectives (state average % correct)
5 th	82% (61% of questions to meet standard)	Objective 2 – Understanding patterns, relationships and algebraic reasoning (72%) Objective 4 – Measurement (74%) Objective 6 – Understanding mathematical processes used in problem solving (74%)
6 th	77% (54% of questions to meet standard)	Objective 4 – Measurement (60%) Objective 2 – Understanding patterns, relationships and algebraic reasoning (64%) Objective 1 – Understanding numbers, operations and quantitative reasoning (68%)
7 th	70% (52% of questions to meet standard)	Objective 5 – Understanding probability and statistics (57%) Objective 2 – Understanding patterns, relationships and algebraic reasoning (58%) Objective 4 – Measurement (58%)
8 th	66% (56% of questions to meet standard)	Objective 4 – Measurement (50%) Objective 1 – Understanding numbers, operations and quantitative reasoning (62%) Objective 6 – Understanding mathematical processes used in problem solving (65%)
9 th	59% (54% of questions to meet standard)	Objective 8 – Understanding measurement and similarity (54%) Objective 10 – Understanding mathematical processes used in problem solving (55%) Objective 1 – Describe functional relationships in a variety of ways (58%)
10 th	63% (54% of questions to meet standard)	Objective 8 – Understanding measurement and similarity (55%) Objective 9 – Understanding percents, proportional relationships, probability, and statistics in application problems (55%) Objective 2 – Understanding the properties and attributes of functions (56%)
11 th	85% (40% of questions to meet standard)	Objective 6 – Understanding geometric relationships and spatial reasoning (53%) Objective 10 – Understanding mathematical processes used in problem solving (55%) Objective 8 – Understanding measurement and similarity (57%)

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Summary of Strengths and Areas for Improvement

Summary of Strengths:

- Thorough, tight alignment to the TEKS
- The 9th – 11th grade units will prepare students to be successful on the TAKS
- Extensiveness/comprehensiveness – multiple and varied lessons and practice sessions
- Structure and organization
- Teacher tools – reports, feedback, tracking tools
- Level of interactivity and engagement
- Student autonomy
- Teacher control is adjustable
- Projects provide extension or a culminating activity for all learners
- Consistency in mini-lessons, unit quizzes, pre-tests, and post-test provide continuity
- Lessons and activities are developmentally appropriate

Summary of Areas Needing Improvement:

- Skills – in 5th – 8th grade, a gap exists between practice exercises and skills required on the TAKS
- Skills – need to develop concepts to higher levels of thinking (Bloom's) so that students are using skills in the context of real situations
- Alignment – there are a limited number of areas that need adjustment – either certain SEs are not addressed or they are addressed inappropriately (see appendices)
- Instructional Methods – need to use more voice in combination with text and need visual models to *show* mathematical concepts with action
- Instructional Methods - mini-lessons need to include more teaching – use models and varied methods – this is where the remediation begins
- Treatment of errors – need to provide tips or hints prior to showing correct answer

Resources

<http://www.tea.state.tx.us/student.assessment/resources/release/taks/>

<http://hagar.up.ac.za/catts/learner/eel/Conc/conceot.htm>

<http://www.curriculumadvantage.com>