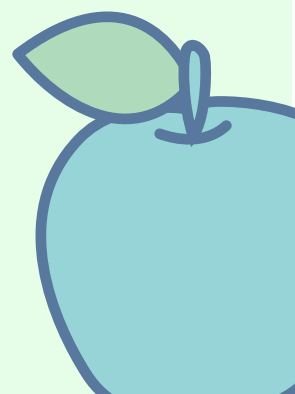
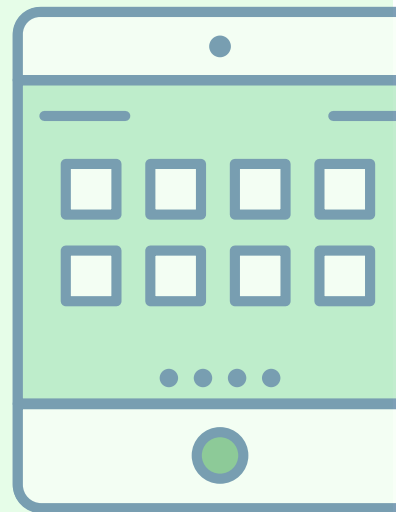
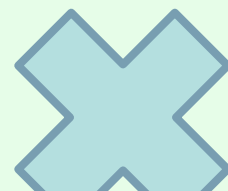
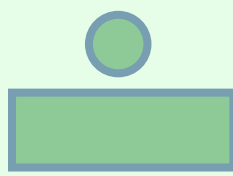
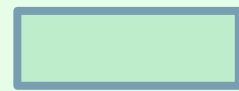
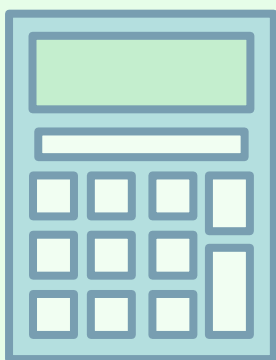


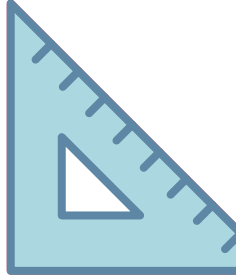
READY NOW MATH DISTANCE-LEARNING RESOURCES

2020–2021

Educational Technology Resources

for use in-class or
for remote teaching
& learning of math





HELLO TEACHERS, TECHNOLOGY INTEGRATION SPECIALISTS AND ADMINISTRATORS,

First, congratulations for helping your students navigate technology and learning during such a challenging time. **We know you are working long hours to ensure that your students still get what they need to succeed.** We also know that there are so many online tools and resources to choose from. It can be overwhelming to figure out how to navigate all of those options or make sense of all of the marketing vying for your attention.

The Math Innovation Network is a national group of math educators and software developers. Together we have created a variety of research-backed solutions that were developed and evaluated with financial support from the Small Business Innovation Research (SBIR) and other programs at the U.S. Department of Education's Institute of Education Sciences, National Science Foundation, National Institutes of Health and U.S. Department of Agriculture. Each of these innovative solutions for the math classroom have been created with feedback and input from students and teachers. Each was tested through pilot and efficacy studies in classrooms examining teacher implementation and student learning. The result is a suite of tools and games that are designed to be deeply engaging to students and that deliver the types of instructional learning experience teachers are counting on.

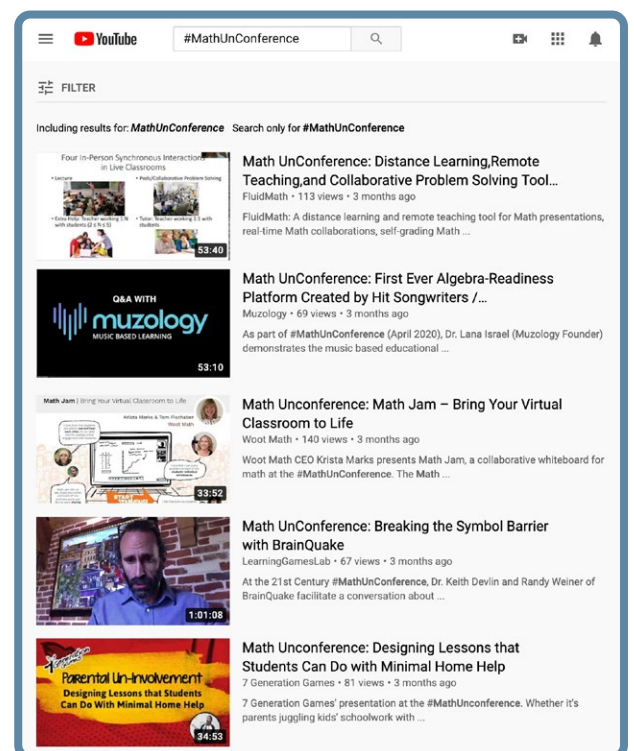
These math tools are READY NOW for teaching and learning: whether you're teaching in person, hybrid, or fully remote. These award-winning solutions are already leveraged nationally, used by hundreds of thousands of students. This curated collection includes individual tools which you can immediately integrate with instruction, as well as more comprehensive systems that include teacher and administrative dashboards.

For more information about how to use each tool in the online learning environment, you can also take advantage of these recorded video sessions from our Math UnConference, [here](#)

Thank you for your work. We are proud to support you as you serve your students. We see you and **we are inspired by your passion for teacher math to our students.**

With Kind Regards,

All of us at the Math Innovation Network



Are you a...

SCHOOL OR DISTRICT ADMINISTRATOR LOOKING FOR:

- Better ways to **support your K-2 learners**, check out KinderTEK, Numbershire, and Teachley
- **Middle school solutions**, check out 7 Generation Games, ASSISTments, Graspable Math, MidSchool Math, Muzology, Querium and Woot Math
- **Collaborative problem-solving tools**, check out Fluid Math and Woot Math

TEACHER LOOKING FOR

- **Engaging math games for Grades 3 - 5**, check out 7 Generation Games, Cyberchase Fractions Quest, Math Snacks, and Teachley
- **Free resources for your middle school classroom**, check out ASSISTments, Math Snacks and Woot Math
- Ways to **engage high-school students remotely**, check out Fluid Math, Querium, Graspable Math and Woot Math

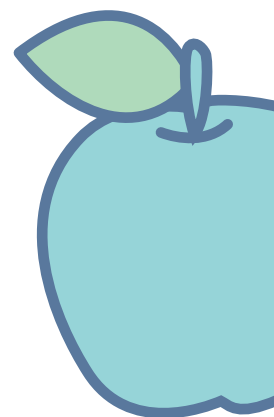
PARENTS LOOKING TO ENGAGE YOUR CHILD

in math learning (or get some help with homework!)

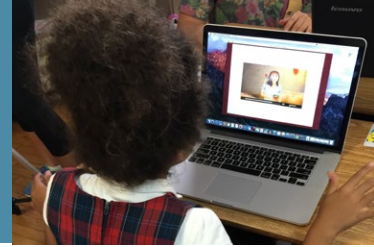
- **Grades K-2**, check out KinderTEK, Numbershire, and Teachley
- **Grades 3 - 5**, check out 7 Generation Games, Cyberchase Fractions Quest, Math Snacks, and Teachley
- **Grades 6 - 8**, check out 7 Generation Games, Math Snacks, Muzology & Querium
- **Grades 9 - 12**, check out Muzology and Querium



DIRECTORY



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Breaking down barriers to success, one math problem at a time	
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<i>Grades 5 – 9</i>	
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Support for students and teachers on independent practice	
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INTERVENTION: 7 Generation Games develops [educational games](#), teacher resources and ready-made inclusive and accessible learning materials that teach mathematics across curriculum and in-context. 7 Generation Games are optimized for universal access, from low-end devices to the latest hardware, available offline and in innovative bilingual formats with integrated scaffolding for ELLs. Educators can access student data via teacher dashboard.

7 Generation Games can be used in the classroom, for distance learning or in a hybrid model, which can be seamlessly adapted in the event that a school is required to change contingency plans with minimal time for advance preparation. Common Core and state-aligned mathematics instruction is integrated with historical content and language arts interwoven into the game narrative. **For Grades K-2**, bilingual augmented reality apps introduce numbers. For **Grades 3-8**, games teach and test standards-aligned mathematics - covering multiplication division, fractions and statistics standards - while providing teachers analytic data and a library of supplemental [teacher resources](#). For **Grades 6-12**, our [game design curriculum](#) uses video game design as a framework for mathematics review and engages learners in real world applications of STEAM principles.



RESEARCH BASE: 7 Generation Games software and teacher resources are developed with classroom educators, drawing from academic research, innovations in technology and real-world best practices. In a randomized controlled study with two schools in Year 1, 62 students who played 7 Generation Games showed a 30% increase in scores on math concepts covered in-game, pre-test to post-test in 10 weeks – a 3x improvement over the control group. In Year 2, in an expanded study with 342 students across four schools, results were replicated. Published peer-reviewed research has demonstrated the value of 7 Generation Games' cross-curricular approach in creating effective learning experiences that improve student engagement and increase perseverance. More on our research can be found here:

<https://www.7generationgames.com/about/research/>

INDUSTRY AWARDS FOR INNOVATION: Named No. 2 App for Kids by Educents (2017); Parent and Teacher Choice Award Winner (2018); Back to Homeschool Award (2016, 2017)

HOW TO ACCESS 7 GENERATION GAMES: 7 Generation Games is available for iOS, Android, Chromebooks, Mac and Windows. School and district licensing is available as an annual subscription. Individual games - free and paid - are available through the company website and on the App and Google Play Store.

GOVERNMENT AWARDS SUPPORTING R&D: 7 Generation Games has been supported by 7 awards from the Small Business Innovation Research Program at the U.S. Department of Agriculture and the National Institutes of Health. Additionally, the company received two rounds of funding from CORFO (the Chilean government's economic development agency) through its Start-Up Chile initiative.



INTERVENTION: ASSISTments makes it possible to assign math content online for free, providing actionable data to teachers and immediate feedback to students. Here's how it works:

1. Teachers select and assign problems from the content found at ASSISTments, including many Open Educational Resources for math like EngageNY and Illustrative Math. ASSISTments integrates seamlessly with popular learning management systems such as Google Classroom and Canvas.
2. As students complete their assignments, they receive immediate feedback to help guide them and maximize learning during independent practice.
3. Teachers receive assignment reports with actionable data insights including common wrong answers and skill gaps, that help them plan future lessons.
4. In class, the teacher can use the information from the Assignment Report to focus instruction where students need the most support. Assignments are no longer just about right or wrong. ASSISTments ensures assignments really count by supporting student learning with feedback and allowing teachers to maximize learning time.



Last year ASSISTments was used by 300,000 students and 11,000 teachers. Demand for ASSISTments, a tool that was designed to support homework as part of in-school learning *but works great for distance learning, and any Hybrid configuration*, increased 5 times during March and April of 2020.

RESEARCH BASE: To find out if using ASSISTments improves learning, a study funded by the US Department of Education was conducted by SRI, an objective research firm. Forty-four participating schools, for a total of 2,728 7th grade students, were divided into two groups: one group continued with their existing methods. The other schools used ASSISTments for their homework, classwork, and skill practice. The differences in learning at the end of the year were dramatic. Students in schools using ASSISTments scored approximately 75% higher than students whose teachers were not using the program. Researchers also found that teachers changed how they reviewed homework and, most importantly, that the use of ASSISTments by teachers started to close achievement gaps, as results were even greater for students with low prior achievement.

INDUSTRY AWARDS FOR INNOVATION: ASSISTments has been identified as one of only a handful of interventions proven effective in mathematics by the [What Works Clearinghouse](#) and [Evidence for Essa](#).

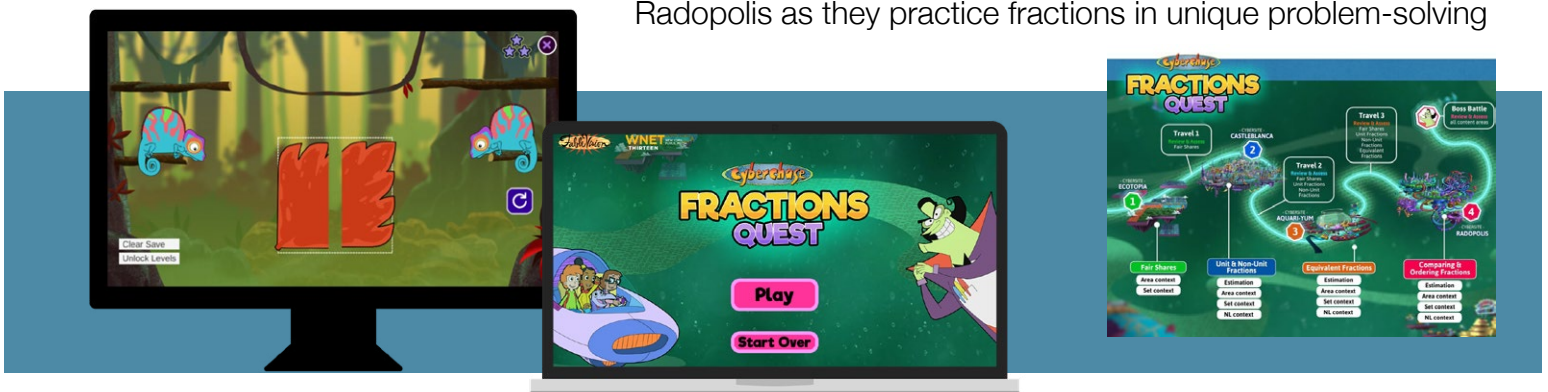
Get Started for free at www.assistments.org

GOVERNMENT AND PHILANTHROPIC AWARDS: multiple NSF grants (e.g., 1931523, 1940236, 1917713, 1903304, 1822830, 1759229, 1724889, 1636782, 1535428, 1440753, 1316736, 1252297, 1109483, & DRL-1031398), as well as the US Department of Education via the Institute for Education Sciences (e.g., IES R305A170137, R305A170243, R305A180401, R305A120125, R305A180401, & R305C100024), and the Education Innovation and Research program . We also thank the Office of Naval Research (N00014-18-1-2768) and finally Schmidt Futures and CZI.



INTERVENTION: FableVision Games invites students to embark on a new immersive journey that integrates an interactive adventure with a research-based approach to fractions learning in [Cyberchase Fractions Quest \(Video Demo\)](#).

Based on the popular, award-winning PBS KIDS television series Cyberchase, and created in partnership with THIRTEEN and the Education Development Center (EDC), Cyberchase Fractions Quest combines an engaging interactive adventure with vetted content aligned to Common Core Standards for Grade 3 and 4 mathematical structure. As players step into the role of the hero, they complete a series of fraction-based mini-games that test and develop their fractions-learning skills in various topics. Each section of the game features a different fraction concept; fair shares, unit fractions, non-unit fractions, equivalent fractions, and estimation with fractions. It brings players into cyberworlds like underwater Aquarium and skate-boarding Radopolis as they practice fractions in unique problem-solving



scenarios. Students learn how to create, interpret, manipulate, and write about fractions. Featuring different worlds and engaging characters, children are able to swipe, tap, and slice their way through the game, developing their fractions knowledge and skills as they work to defeat the villain Hacker! The [classroom version](#) and associated Teacher Guide is available on [FableVision Games](#) for in-class and remote learning.

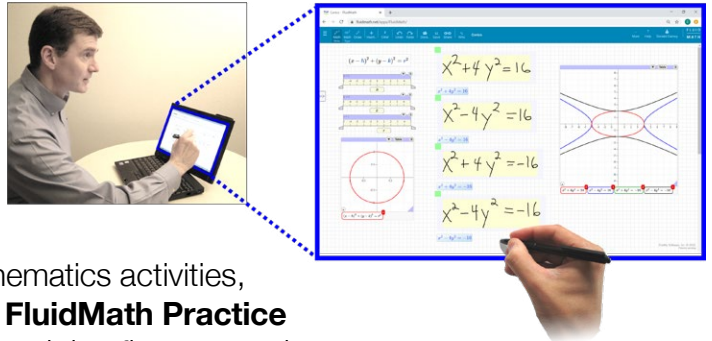
RESEARCH BASE: Informed by the research of project advisors Robert Siegler, PhD (Carnegie Mellon) and Geetha Ramani, PhD (University of Maryland), Cyberchase Fractions Quest takes a unique approach to fractions learning. During development, the game was refined through multiple playtests with children in Boston and New York City. Education Development Center (EDC) researchers evaluated the 2016 prototype's impact on children's understanding of fractions, gather data to improve its design, and assess its appeal among children and educators. A 2019 pilot study of 78 students was conducted in New York City over 3-6 weeks for both pre- and post-assessment and found evidence of promise in Cyberchase Fractions Quest's ability to support third-grade students in mastering challenging fractions concepts. Overall, students improved by a total of 6.9 points from pre to post; however, treatment students improved by 8.3 points, while control students improved by 5.8 points, a statistically significant difference. In percentage terms, Fractions Quest students improved by about a third (0.32), while students who did not play the game improved by slightly less than a quarter (0.22). For more information on Cyberchase Fractions Quest's research, see fablevisiongames.com/fractions-quest.

HOW TO ACCESS CYBERCHASE FRACTIONS QUEST: Cyberchase Fractions Quest is available on FableVision Games at fablevisiongames.com/fractions-quest. It is a web-based game that is available on Windows 10+, Mac OS 10.13+, and Chromebook.

GOVERNMENT AWARDS SUPPORTING R&D: Cyberchase Fractions Quest is a result of a 2.5-year-long research project as part of the IES Department of Education SBIR program.

INTERVENTION: Fluidity Software’s research-based educational technology products are designed for in-classroom, hybrid, and distance learning and teaching of K-12 and Higher Education Mathematics. **FluidMath** combines the familiar and natural experience of sketching math problems with the power of computer-generated solutions. Users simply write math expressions and make drawings on the screen of a touchscreen computer while FluidMath recognizes the handwritten math notation and sketches and generates solutions in the form of algebraic expressions, computations, graphs, and dynamic animations.

Collaborative FluidMath is the first Collaborative Whiteboard designed specifically for Math teaching and learning and enables teachers and students to share the same virtual Mathematics whiteboard and workspace in real-time. It is also a platform for Collaborative Problem Solving on which students work together to solve math problems. **webFluidMath** enables teachers to easily create, distribute, and provide feedback on Mathematics activities, assignments, and self-grading assessments via the web. **FluidMath Practice** is a fun application for K-5 students to practice automaticity, fluency, and numeracy in a gaming environment while also providing teachers and administrators with data about student performance. FluidMath has been used by tens of thousands of STEM educators teaching hundreds of thousands of students in over 100 countries. More information can be found at www.fluiditysoftware.com and www.fluidmath.net.



YouTube videos of FluidMath can be found here:

- FluidMath Introduction: <https://youtu.be/BAFGONn4KoQ>
- Real-time Collaborative Whiteboard for Math: <https://youtu.be/VHDLUteCI0A>
- Full demonstration of the FluidMath platform: https://youtu.be/K_8yZAH0c0k

RESEARCH: Survey research was conducted in collaboration with the Brown University Education Alliance to test the feasibility, usability, and promise of FluidMath and associated Online Professional Development to support student learning. Another study included 229 students in grades 8 to 10. Test scores from 131 students collected in 10 classrooms wherein the teachers used FluidMath were compared to test scores from 141 students collected in 10 classrooms wherein teachers did not use FluidMath. During this study, teachers used FluidMath for between 1 to 3 class periods on many Algebra topics. Results demonstrated that FluidMath functioned well, was able to be integrated within instructional practices by all teachers and was engaging for students. Results also demonstrated that the average end of test scores for the Algebra topics were significantly higher in classrooms where FluidMath was used.

INDUSTRY AWARDS: FluidMath has won many industry awards including: “The Most Innovative Educational Technology Product” by Software and Information Industry Association (SIIA); “IES SBIR Success Story” by Department of Education Institute of Education Sciences (IES); eSchool News Readers’ Choice Award; NYC Gap App Challenge; and, “1st Place” as Microsoft Office “Best Performing Office Add-On”.

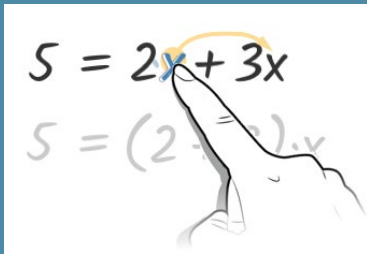
HOW TO ACCESS FLUIDMATH: FluidMath is a web-based application that can be accessed on any internet-connected device including Windows devices, Apple laptops, iPads, Chromebooks, and more. FluidMath is available on a subscription basis to individuals, teachers, schools, and districts.

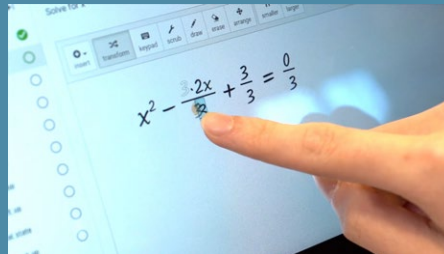
GOVERNMENT AWARDS SUPPORTING R&D: Research and Development for Fluidity’s technology has been supported with multiple awards from the Small Business Innovation Research (SBIR) Program of the US Department of Education, National Institutes of Health, and National Science Foundation.



INTERVENTION: Graspable Math (GM) is a digital algebra notation system that empowers students in their use of algebraic notation. In GM, students rewrite algebraic expressions step-by-step by picking up and dragging terms, which then react in mathematically consistent ways. This allows students to explore and play with algebraic structure in a risk-free environment, where they can attempt any step they want to try and get immediate feedback. The visual and motor experiences build algebraic intuitions and the feedback naturally sparks conversations about the concepts behind the activities. [GM Intro Video](#).

[Graspable Math Activities](#) allows teachers to create and assign interactive, algebra-related activities to their students and view student work in real time. [Graspable Math Canvas](#) is a free online math whiteboard for teacher demonstration and student practice. In [From Here to There](#) (FH2T), a self-contained algebra puzzle game, elementary and middle school students explore algebra manipulations through game levels and worlds.


$$5 = 2x + 3x$$
$$5 = (2 + 3)x$$


$$x^2 - \frac{2x}{3} + \frac{3}{3} = \frac{0}{3}$$



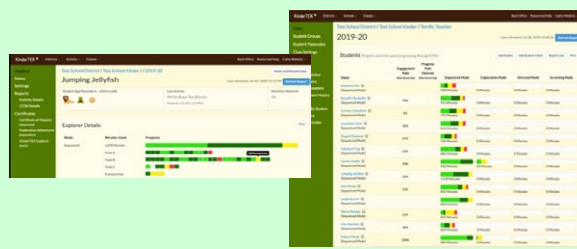
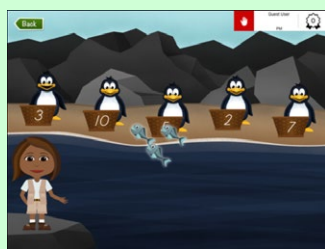
RESEARCH: Graspable Math (GM) is built on a foundation of research into how students best reason about formal algebra notation, and the combined experience of classroom teachers, cognitive scientists, and educational researchers. Graspable Math Activities has demonstrated usability and feasibility of implementation in middle school and high school classrooms. GM also has evidence of impacts on learning. In a classroom study with 85 sixth- and seventh-graders, students had statistically higher gain scores on a test of procedural fluency after experiencing GM-based fluid gesture-animation training in FH2T, compared to business-as-usual instruction. In 2019, a randomized controlled trial with 700 6th grade students led to increased gains in conceptual learning after two-hours of using FH2T compared to completing problem sets with hints and immediate feedback in ASSISTments (improvement index=7%). A large IES efficacy study with 4,300 7th grade students is currently underway to examine GM-driven learning gains over three other technology conditions at scale. [Research Overview Video](#)

HOW TO ACCESS GM: The Graspable Math applications can be accessed freely by K-12 school teachers and students on any internet connected device at graspablemath.com. Schools and districts interested in a license for Graspable Math Activities should contact us at contact@graspablemath.com.

AWARDS SUPPORTING R&D: Graspable Inc. has been supported by a Translational Research Grant by the Johnson Center for Entrepreneurship & Innovation, as well as by three US Department of Education grants from the Small Business Innovation Research Program and the Cognition and Student Learning Program of the Institute of Education Sciences.



INTERVENTION: KinderTEK's individualized educational system provides instruction and targeted practice shown to support deep and lasting learning. Systematic, focused lesson content and Pretest - Guided Practice - Test lesson structures, combined with KinderTEK's continuous progress monitoring ensure students demonstrate mastery in each phase of learning before moving on to more independent and challenging tasks. Carefully chosen practice opportunities, "just enough" scaffolding and timely academic feedback is provided in every lesson. KinderTEK is a versatile tool and can be used in class, at home, or a combination of the two: students can use the same account and teachers can customize settings and view reports no matter where students learn. KinderTEK empowers each student to experience success and gain confidence as they learn, become proficient at, and review KinderTEK's Common Core-aligned kindergarten content ([KinderTEK curriculum](#)). Students are motivated through engaging content, intermittent rewards, positive feedback, mastering new content and unlocking new activities and activity center time in each session. Robust reports on KinderTEK's Data Dashboard facilitate data-driven decision making and customizable features enable teachers to adjust the instructional experience to meet the needs of individual students as they progress through the curriculum.



RESEARCH BASE: KinderTEK was developed with [years of iterative research](#) by teacher educators and faculty with extensive classroom and special education teaching experience. Several small-scale studies in real classrooms provided evaluation for custom components which were integrated into the app and reporting system. A 2018-19 quasi-experimental study of 123 students revealed that relatively brief exposure to KinderTEK produced gains on distal measures of early numeracy and exploratory analyses suggested that earlier and longer use of KinderTEK may have provided a benefit for students most at risk in math. In further investigation through dissemination studies and full scale efficacy trials, KinderTEK was seen by hundreds of teachers and thousands of students across the US and Canada. Analyses of complete efficacy data with over 2000 students and 150 educators over a period of three years are in progress. Meanwhile, parents and teachers have independently turned to KinderTEK for use by their students. With the pandemic, we offered KinderTEK as a stopgap for distance learning and, as we head into the fall, we encourage educators to integrate KinderTEK into their systematic, planned math instruction, particularly for students at-risk in math.

More information can be found on the website at <https://kindertek.com/why-ktek/research>

HOW TO ACCESS KINDERTEK PRODUCTS: KinderTEK is available in the App store for use on any iPad. The Basic version is a [standalone app](#), with a Pro version for more implementation flexibility and robust reporting available via [subscription](#).

GOVERNMENT AWARDS SUPPORTING R&D: The research reported here was supported by the U.S. Department of Education through the Institute of Education Sciences Grants R324A110286 and R305A170044 and the Office of Special Education Programs Grant H327S140019, all to the University of Oregon. The views expressed herein do not necessarily represent the positions or policies of the Department of Education. No official endorsement by the U.S. Department of Education of any product, commodity, service or enterprise mentioned in this publication is intended or should be inferred.



New Mexico State University in Las Cruces, NM

Building conceptual understanding
of key mathematical ideas

Website: <https://mathsnacks.org>



INTERVENTION: Math Snacks are free animations and games which can easily be integrated with any math instruction in grades 4–8. They help students build their understanding of hard-to-grasp mathematical concepts. Teachers can easily implement each game or animation into their existing instructional program.

The popular [Math Snacks](#) games and animations have been used successfully to supplement in-class, remote, and hybrid learning in upper elementary and middle schools. Each Math Snack has a teacher guide with supplementary learning activities, suggestions for teaching, and Common Core Standards. The six animations also have comic book transcripts, and learner guides where users can apply the concepts they've learned. Each of the seven games and the interactive teaching tool has game review videos so teachers can understand how the game is played, without playing it. The [Teaching With](#) part of the site includes all teacher support materials. All games and animations are available in English and Spanish.



RESEARCH BASE: Math Snacks materials have undergone careful user testing, formative evaluation, as well as research to document learning gains and show feasibility in classrooms and online programs. In a large scale randomized control trial (2013–2014), students engaged with Math Snacks in class learned more math than those with access to just classroom instruction (741 students from 48 fifth grade classrooms in a low-income urban school district over a five-week intervention). Research conducted in classrooms during 2018–2019 suggests gains in understanding of pre-algebra, as well as positive changes in the ways teachers approach instruction. Math Snacks team members continue to conduct integrated research activities, including foundational research, extensive user testing, professional development of teachers and investigation into impacts on learners. **Math Snacks games and animations have been played more than 11 million times online since 2015.**

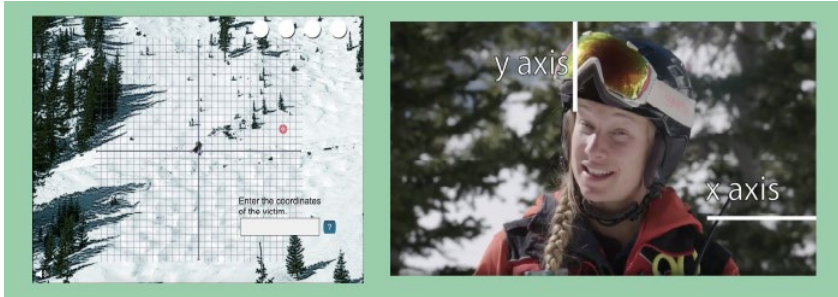
INDUSTRY AWARDS FOR INNOVATION: Gold, International Serious Play Awards 2020 (Curse Reverse); Silver, International Serious Play Awards 2019 (Agronautica); Balefire Labs Top-Rated App 2015 (Ratio Rumble); Best in Show, International Serious Play Conference 2014 (Gate); finalist, Serious Games Showcase & Challenge 2012 (Gate); Gold, International Serious Play Awards 2013 (Game Over Gopher, Ratio Rumble); finalist, Serious Games Showcase & Challenge 2012 (Game Over Gopher).

HOW TO ACCESS OUR PRODUCTS: All are free to play at MathSnacks.org. (Ratio Rumble and Pearl Diver are also available from the Apple App Store [Learning Games Lab, NM State University](#)).

GOVERNMENT AWARDS SUPPORTING R&D: Math Snacks has been supported by two awards from the National Science Foundation (0918794 and 1503507). Some materials were originally prototyped or discussed as part of a cooperative agreement from the U.S. Department of Education (U295A050004).



CORE CURRICULUM™: [Core Curriculum™](#) by [MidSchoolMath](#) is comprehensive content for grades 5-8, comprised of dynamic, integrated technologies to transform how math is taught. The central, flagship intervention, [The Math Simulator™](#) represents a significant breakthrough in online math curriculum, combining high quality videos with advanced math simulators, where students directly experience how the math actually works, while having the opportunity to fail safely. [The Math Simulator™](#) contains a unique story and simulator for all 146 middle grade Common Core State Standards. The Curriculum also includes three exclusive story-based math games ([Ko's Journey](#), [EMPIRES](#) and [Fate and Fortune](#)). Its premier



game, [EMPIRES](#), is a multiplayer 7th grade game set in Ancient Mesopotamia, where students create buildings, herd sheep, practice medicine, and tend to the needs of the people using math in a way that makes sense. [Core Curriculum™](#) by [MidSchoolMath](#) is complete with an adaptive test trainer, proficiency assessments, cross domain lessons, clicker-based instant feedback and progress monitoring. The Curriculum can be used in the classroom, for remote learning or in a hybrid teaching situation.

RESEARCH: MidSchoolMath products have been used in more than 500 schools and over 3000 teachers and 60,000 students. The products consistently function across operating systems and devices and a re-enrollment rate of nearly 90% from year to year and feedback from users across schools and classrooms also support successful implementations at scale. Across five pilot implementation analyses, 12 teachers reported higher engagement of students in various learning settings, including in-classroom, remote and hybrid. Surveys responses by 800 students reported high levels of engagement and interest in MidSchoolMath tasks. Built on a decade of research and development, [Core Curriculum™](#) by [MidSchoolMath](#) also showed higher achievement in two randomized controlled trials (RCT). In the first study with 435 students, MidSchoolMath showed significant achievement gains from pre to posttest compared to two other national curricula. In the second study with 265 students, MidSchoolMath showed higher learning effects than typical math programs. An additional RCT determined that the order of instruction was insignificant but the increase from pre to posttest of both groups using MidSchoolMath were consistent with the first two studies. See: [The Research Behind Core Curriculum by MidSchoolMath](#).



INDUSTRY AWARDS FOR INNOVATION: [2011 Solution's Award|NMTC Technology](#); [2011 People's Choice| National STEM Game Challenge](#); [2012 Academic Gaming Solution|Ed Tech Digital Awards](#); [2014 Reader's Choice |EschoolMedia](#); [2014 Official Selection| eduFILM at SWSedu](#); [2014 Apps for Class | Verizon](#)

HOW TO ACCESS MIDSCHOOLMATH PRODUCTS: Schools and districts may purchase [Core Curriculum™ by MidSchoolMath](#) through annual or multi-year student licenses. The Curriculum is delivered on a proprietary learning management system and may be accessed on all web-based devices, including computers, Chromebooks, iPads, and Tablets. MidSchoolMath's distinct pedagogy and products are also featured at its annual [MidSchoolMath National Conference](#).

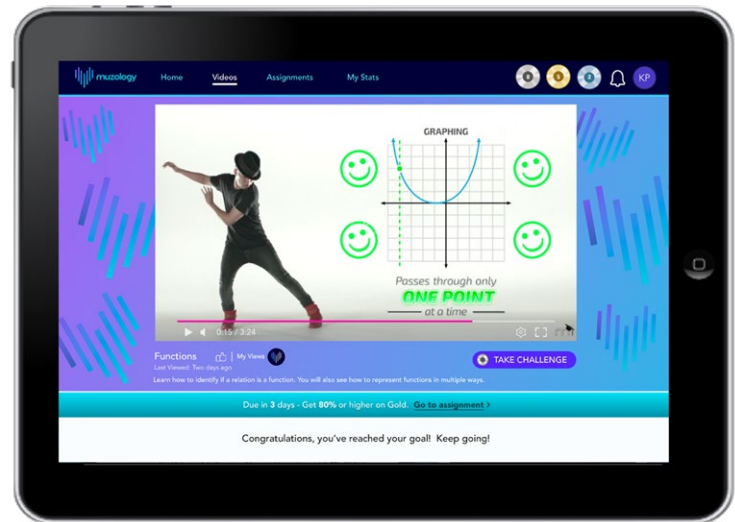
GOVERNMENT AWARDS SUPPORTING R&D: 2011 Bill & Melinda Gates Foundation NGLC; 2012 ED/IES SBIR Phase I; 2013 ED/IES Phase II; 2016 NSF SBIR Phase I; 2017 NSF SBIR Phase II; 2017 ED/IES SBIR Phase I; 2018 ED/IES SBIR Phase II



THE FIRST-EVER MUSIC-BASED ALGEBRA READINESS PLATFORM CREATED BY HIT SONGWRITERS!

INTERVENTION: Developed by a team of learning experts, PhDs, and hit songwriters, Muzology uses music videos to make learning math fast, fun, and effective. Muzology's songwriters have worked with today's hottest artists, such as Ariana Grande, Justin Bieber, Carrie Underwood, and Beyoncé! Muzology's innovative platform is based on the premise that many students struggle with learning yet know the words to countless pop songs. That's because music directly activates brain regions critical for successful learning: memory, attention, motivation, and emotion. **Muzology's algebra-readiness platform offers accessible, high-engagement learning for ALL students.**

Muzology's **multi-sensory music videos** are mapped to standards and contain catchy melodies, engaging graphics, and choreographed dance moves, which synergistically reinforce the information presented. Students apply and extend their learning through a series of gamified math challenges, which increase in complexity and serve as formative assessments. The platform is designed to transition students from the explicit instruction of Muzology's math music videos to guided practice.



RESEARCH: Muzology draws on the latest findings in learning theory and cognitive psychology to offer a pedagogically sound approach to math instruction. Muzology has been implemented by teachers in hundreds of classrooms and in remote learning environments; students report that the intervention is highly engaging, especially compared to traditional math instruction. Several studies demonstrate that Muzology is a promising intervention that supports student learning. In a 2015 randomized controlled trial with 60 students in grade 6, students who used Muzology's music-based videos increased significantly on a measure of recall of fraction-related math content and answered twice as many of these questions correctly compared to students in the control group, who saw the same content presented in conversational videos. During a 2016 district-wide Summer Bridge program with 300 grade 8 students, 99% of students who used Muzology improved from baseline on quizzes measuring proficiency with specific pre-algebra skills and procedures--with 87% of students improving their baseline score by more than 50%. On a district pre- and post-test diagnostic measuring pre-algebra proficiency, these students improved twice as much on questions for which there was a corresponding Muzology video compared to questions for which there was no corresponding video. A 2017 Muzology pilot conducted with over 4,200 grade 6-9 students demonstrated that, on a measure of specific pre-algebra content and skills, the average pre-test score of 42% increased to an average post-test score of 77% after watching a Muzology video.

INDUSTRY AWARDS: 2020 Winner, Software & Information Industry Association's (SIIA) Innovation Showcase; 2018 Winning Cohort, National School Boards Association (NSBA) Innovation Showcase

HOW TO ACCESS MUZOLOGY: Muzology's web-based learning platform can be accessed on any internet-connected device. Muzology is available on a subscription basis to districts, schools, teachers, parents and students. Muzology scholarships are available for qualifying schools, teachers, and parents. To find out more, visit muzology.com.

GOVERNMENT AWARDS SUPPORTING R&D: Muzology has been supported by three awards from the Small Business Innovation Research Program at the National Science Foundation and US Department of Education.

OVERVIEW: NumberShire Level 1 is an educational mathematics video game developed to build students' whole number concepts and skills. Through an immersive, gaming and learning platform, NumberShire provides 48 sessions (~15 minutes of game play per session) set within a Renaissance-style village in the fairytale-inspired medieval kingdom of NumberShire. Each session is aligned with the Common Core State Standards for Mathematics with a focus on first grade topics. In each session, the village elder and other characters explicitly teach students new math skills and provide ample practice opportunities. Students receive timely and engaging feedback about their game play performance and earn visual rewards, such as virtual pets or new costumes for their character after completing each session. Session design is based on the growing research base on effective mathematics instruction for struggling learners, and its differentiated learning pathway offers individualized and intensified instruction to meet students' instructional needs. Two versions of NumberShire exist (WebGL and iOS), allowing NumberShire to run on all popular web browsers on PC or Mac platforms and on iPads.



TEACHER DASHBOARD & RESOURCE CENTER: The Teacher Dashboard allows teachers to monitor student performance and progress in NumberShire, and make data-based decisions about how to adjust and individualize instruction for student learning. From the Teacher Dashboard, teachers can also access the Resource Center which includes instructional resources on best practices in early math instruction, multi-tiered systems of support, implementing NumberShire, and differentiating instruction for students with diverse learning needs.

RESEARCH RESULTS: A randomized controlled trial conducted in 26 first grade classrooms found that students in the NumberShire group ($n = 125$) performed better than control students ($n = 125$) on a math assessment designed to measure learning in the Common Core State Standards for Mathematics. Results of the 8-week pilot study demonstrate that NumberShire can significantly improve mathematics learning in the domains of Counting and Cardinality, Number and Operations in Base Ten, and Operations and Algebraic Thinking. Similarly, preliminary findings from a [recent efficacy study](#) with over 1,500 students demonstrated positive effects of NumberShire on various measures of math achievement.

HOW TO ACCESS NUMBERSHIRE: Visit www.numbershire.com for more information

FUNDING INFORMATION: NumberShire was developed with funding from the U.S. Department of Education, Institute of Education Sciences, Small Business Innovation Research Programs (EDIES11C0026, EDIES12C0045, EDIES13C0045), a National Center on Special Education Research Development and Innovation Grant (R324A120071), and Efficacy and Replication Award (R324A160125), and the Office of Special Education Programs Stepping-Up Technology Implementation Portfolio (H327S160019).



INTERVENTION: Querium supports teaching and deepens learning by building students' conceptual understanding, fluency, and problem-solving skills for math. Querium's *StepWise Virtual Tutor* ([Video Demo](#)) uses patented AI techniques based on the wisdom of master teachers to help students navigate the steps to solve problems as they would in the real world. Querium's products can be used for fully in-class, fully remote, or in hybrid teaching and learning situations for grade 6 through college. Students receive constant encouragement in StepWise as they master the math skills they need for success in college and careers. Querium's web-based apps include: *MathBooster* ([Video Demo](#)), which helps students develop math skills in pre-Algebra, Elementary Algebra, Intermediate Algebra, Data/Statistics/Probability, and Geometry; *Rover* ([Video Demo](#)) manages online math homework, and exams, using the power of StepWise Virtual Tutor to assess and tutor students. Developed in partnership with leading OER publisher OpenStax at Rice University, *Rover* covers topics from Algebra through Calculus. *Rover* integrates with leading learning management systems. The *MathBooster* and *Rover* products provide teachers with real-time insights to monitor progress and differentiate math instruction for individuals and groups of students. Training materials for instructor PD are available, and professional services are available to customize instructional content and assessment to match an institution's curriculum.



RESEARCH BASE: Querium's products are based on years of classroom teaching experience and on AI research into goal-seeking problem solving and effective math instruction.

A total of 30,000 students have used *MathBooster*, and 20 schools used *Rover* in Spring 2020 specifically due to Covid-19, demonstrating the usability and feasibility of this intervention for in-class or remote implementation. In a pilot study to test the promise of StepWise to improve student learning, a treatment group of middle-school students scored significantly higher on a standardized math algebra placement test than control group students. For more information on this study, [see here](#). Another study conducted at SUNY Onondaga College in NY showed that 62% of incoming college students were able to bypass one or more dev ed math courses using *MathBooster*, and 42% were able to skip all dev ed math courses. That same cohort of students were then tracked and 83% of the *MathBooster* treatment group passed their first college-level math course with an A, B, or C. This pass rate was approximately double the historical pass rate for these math courses at SUNY OCC. For more information on this research, [see here](#).

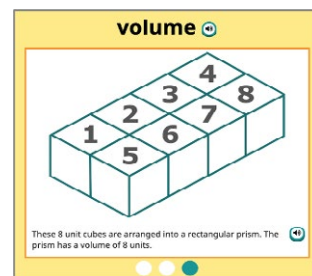
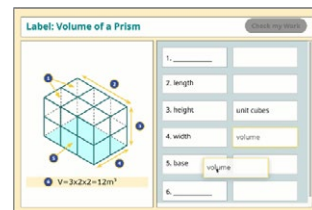
INDUSTRY AWARDS FOR INNOVATION: FastCompany's Top 10 Most Innovative Companies in Education 2016.

HOW TO ACCESS QUERIUM'S PRODUCTS: Querium's browser-based apps are available for use on Smartphones, iPads, Tablets, Chromebooks, and other computers. The *MathBooster* programs are available for individual purchase by students and parents in the Querium website www.querium.com, and by volume sales to schools, districts, and colleges. The *Rover* math homework system is available for adoption by schools, districts and colleges.

GOVERNMENT AWARDS SUPPORTING R&D: Support provided by 2015 and 2016 ED/IES SBIR awards.



INTERVENTION: Speak Agent “Math+Language” engages students in their K-8 math curriculum content through digital listening, speaking, reading, writing, modeling, and problem-solving activities that apply the math practices. Using Speak Agent, students accelerate acquisition of math concept knowledge and development of math communication skills. School districts use Speak Agent as a K-8 supplemental program in both physical and virtual classrooms. It delivers a suite of activities for teacher-led instruction, independent practice, and peer collaboration. Each of the 20 activity types in Speak Agent engages students in one of these modes using a combination of multimodal gameplay, visual aids, interactive stories and/or expressive language. The program is particularly effective for English Learners, low-SES students, and learners who experience an academic language deficit. Speak Agent products include: [Elementary Math](#), [Middle-Grades Math](#), [Algebra for English Learners](#), and [Bilingual K-2 Math](#). Each product includes a teacher dashboard that displays real-time progress, formative assessment data, and items added to the student’s digital portfolio. Speak Agent offers year-round professional learning, including 1:1 teacher coaching, a PD knowledge base and video series, and a unique Academic Language Strategies course that showcases research-based instructional strategies.



RESEARCH: Speak Agent is certified in Research-Based Design. Each of its 20 activity types across every product applies research-based strategies using its [academic language learning model](#). These strategies were applied to product design and development in partnership with Digital Promise’s Learner Variability Project, among other research partners. As a result, three pilot studies have demonstrated the promise of Speak Agent to support academic concept acquisition: A [QED study](#) (N=74) in 2017-2018 by Rockman et al found that 2nd grade students using Speak Agent acquired 40 to 52 new TEKS-aligned STEM concepts at a 210% faster rate than students in the control group receiving standard instruction. The effect was repeated in two 12-week phases. In 2018, Montgomery County (N=67) found similar results over a 12-week period in both STEM and reading. Both populations were 80% English Learner. A small-scale [pre/post study](#) by LEANLAB Education in 2019 saw significant gains among 7th graders (N=13) over 9 weeks in reading on KIPP’s quarterly assessment.

As of 2020, Speak Agent serves more than 40,000 active students each week and growing. Speak Agent has consistently demonstrated feasibility, usability, and evidence of promise because it is practical to implement in real-world teaching environments. Teachers report being able to learn the basics in a 45-minute training session. Speak Agent products closely align with the classroom curriculum week by week. So, when students are learning about the volume of cylinders and cones or creating probability trees, Speak Agent is teaching the relevant, curriculum-aligned academic language to support that work.

INDUSTRY AWARDS FOR INNOVATION: Winner, [2016 NewSchools Ignite ELL Challenge](#); Certified Product, [Research-Based Design](#).

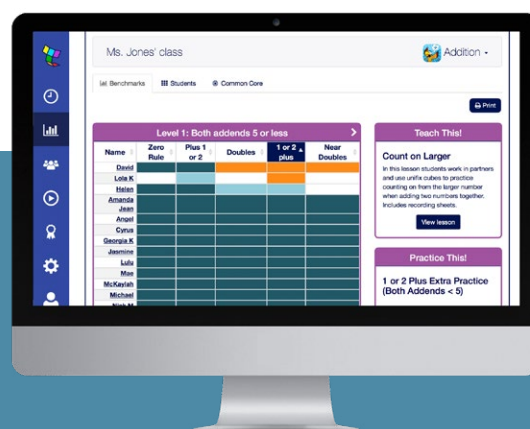
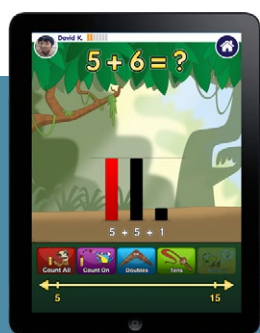
HOW TO ACCESS TEACHLEY’S PRODUCTS: Speak Agent Math+Language is provided to school districts as an annual subscription. It runs on any computer or mobile platform and supports in-classroom use, virtual classroom use, remote independent practice, and hybrid models.

Learn more at speakagent.com.

GOVERNMENT AWARDS SUPPORTING R&D: Speak Agent has received vital R/R&D support from US Department of Education award ED-IES-15C0027 and National Science Foundation award 1632488.



INTERVENTION: Teachley supports teaching and deepens K-5 math learning by building students' conceptual understanding, fluency, and problem solving skills. Teachley includes a suite of learning games and a teacher dashboard that personalize students' learning of mathematics and can be used for in-class, remote, or blended teaching. Teachley's games help students develop efficient strategies and deeper conceptual understanding. The apps include: *Addimal Adventure* ([Video Demo](#)), which help students develop addition strategies while discovering the connections between facts. For example, they can see how $5 + 6$ is just one more than $5 + 5$; *Mt. Multiplis* ([Video Demo](#)) focuses on the distributive property, making clear how 6×8 can be expressed as 5 groups of 8 plus 1 more group of 8; Three fractions games, *Fractions Boost* ([Video Demo](#)), *Fractions Boost 2*, and *Fractionators* help students develop strong fractions sense; and the newest game *Market Bay* ([Video Demo](#)) is an immersive 3D world where students do math everywhere they go. The Teachley Connect dashboard ([Video Demo](#)) provides teachers real-time insights to differentiate math instruction.

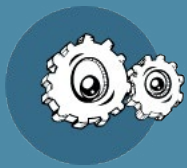


RESEARCH: Teachley's apps are based on years of classroom teaching experience and [research](#) on children's cognitive development, mathematics pedagogy, and game design. Teachley embeds research into every stage of design, from pencil/paper mockups to small-scale learning studies to larger classroom evaluations. Thousands of teachers have successfully implemented Teachley in classrooms (with a 96% re-enrollment) and hundreds of thousands of children have played the apps in class and at home. Researchers have conducted several research studies to evaluate the promise of Teachley to improve learning. In a 2014 randomized controlled trial with 80 students in grades 1 to 4, students who were randomly assigned to play Teachley increased in math fluency and strategic math talk outcomes compared those who played other math games. In a 2018 randomized control study with 133 students, students in grades 3 to 5 who played Teachley's Fractions Boost game significantly improved their fractions estimation compared to students in the control group who played other fractions games. In the same study third graders significantly improved on a set of released NAEP fractions questions. In a 2018 study of the Teachley Connect dashboard, teachers reported they could easily use the students' data to monitor app usage, prepare for meetings, and to plan intervention lessons. For more information on Teachley's research, see teachley.com/research.

INDUSTRY AWARDS FOR INNOVATION: Winner, [2014 Apple Design Award](#); 2016 Balefire Labs Top-Rated, 2014 Parent Choice Award; 2017 Children's Technology Review Editor's Choice.

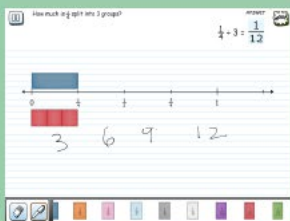
HOW TO ACCESS TEACHLEY'S PRODUCTS: [Teachley](#) is available as a subscription service for schools and districts. Teachley's games are available for use on iPad, tablets, Chromebooks, and other computers (web-based). The apps may also be purchased individually on the App store.

GOVERNMENT AWARDS SUPPORTING R&D: Teachley has been supported with 12 awards from the Small Business Innovation Research Program from the US Department of Education, National Science Foundation, and the National Institutes of Health.



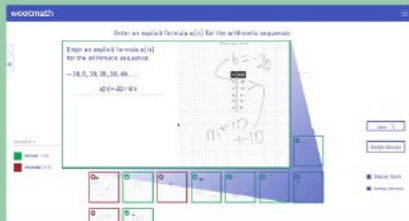
INTERVENTION: Woot Math provides engaging, research-based tools for the math classroom. This award winning platform enables teachers to more efficiently help their students build confidence, increase conceptual understanding, and bring joy to the math classroom – Woot! Woot! Woot Math’s program includes applications and tools tailored for bringing the math class to life...

ADAPTIVE LEARNING



Instructional Video, Self Paced, and beloved by students (G3-7)

FORMATIVE ASSESSMENT



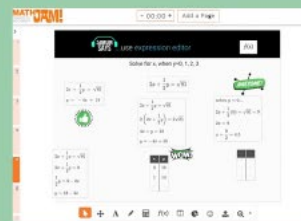
Warmup, Exit Tickets, Quiz, and more with Student Work (K-12)

TEAM MODE



Peer-to-Peer Learning was never more engaging (K-12)

MATH JAM



Online Collaborative Whiteboard - perfect for remote learning

Woot Math supports fully in-class, fully remote, and hybrid instructional contexts. The platform makes it easy for teachers to access and leverage data and track assignments. Since 2015, Woot Math has been used by 25,000+ teachers, 510,000+ students in all 50 states.

RESEARCH BASE: Woot Math utilizes research in learning sciences and math education to inform our products and help teachers to maximize student learning with technology. In a [survey](#) of which edtech companies are producing the best research-based products (Digital Promise), Woot Math was ranked highest for evaluation research and in the top three for being based in the learning sciences. This is a research backed program that is being used at scale: to date over 25,000 teachers have successfully implemented Woot Math with their students to support their math classroom.

Woot Math’s adaptive software has been demonstrated to work: a randomized controlled trial with 358 students in grades 3-7 showed that the adaptive capabilities in Woot Math’s software significantly improved students’ learning and conceptual understanding of fractions compared to students who were randomly selected to use a version of Woot Math with less adaptive capabilities. Another randomized trial with over five hundred students in grades 4-5 showed that replacing about an hour per week of their usual classroom activities with Woot Math approximately doubled the rate at which students mastered the material being covered. For usability and engagement measures, almost all teachers who use Woot Math say that they would recommend it to a colleague; and over 90% of students say they would recommend Woot Math to another student. For info, [here](#).

INDUSTRY AWARDS FOR INNOVATION: Common Sense Media [Top Pick for Middle School Math](#) and [Top Pick for Math Games](#); [EdSurge/Digital Promise](#) winner for Evaluation Research & Learning Sciences; The Bill and Melinda Gates Foundation’s Bright Spots in Middle Years Math award from; EdTech Digest Finalist for Best [Math Solution](#) and [Adaptive Technology](#); Academics Choice [Smart Media Award](#).

HOW TO ACCESS WOOT MATH’S PRODUCTS: Woot Math is available for computers (web-based), Chromebooks (Android Play Store), and Apple iPad (Apple App Store). Woot Math is available as a [subscription service](#) to teachers, schools and districts.

GOVERNMENT AWARDS SUPPORTING R&D: Woot Math has been supported with 6 awards from the Small Business Innovation Research (SBIR) Program from the US Department of Education and the National Science Foundation.

