**Community Math Literacy Initiative**

**Milestone 02**

**Meeting and Progress Summary**

Coordinated by Flagstaff’s STEM Consortium and Flagstaff Forty Educational Task Force

**Mission:**

Develop a community-wide response to increase mathematics literacy and achievement, specifically addressing student success in meeting grade level expectations in mathematics\* and exhibiting readiness for higher education mathematics courses.

\*In 2013, 68% of third graders and 55% of eighth graders in Flagstaff met grade level expectations in 2012-13.

[Arizona Daily Sun article summarizing the local schools performance on the 2013 AIMS exams](http://azdailysun.com/news/local/education/flagstaff-students-hold-their-own-on-aims-tests/article_8b1895b6-fad1-11e2-9f73-001a4bcf887a.html)

**Milestone Goals:**

1) Identify and clearly state the root causes of the poor performance.

*2) Determine cost effective and simple solutions that work with and enhance the existing education infrastructure. Also determine metrics that can be used to judge effectiveness of the solutions.*

3) Develop community support for the identified solution(s) and funding sources.

4) Implement the solutions.

5) Using pre-determined metrics, review impact of the solutions.

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Summary of Community-Centric Recommendations from January 15th Meeting, Consultation with Flagstaff Chamber of Commerce Education Committee and Other Sources:

Building Students’ Skills & Persistence:

* Math/STEM Camp:

By providing a learning environment for students who are struggling, as well as those who would like to improve their math skills, the camp could reinforce the foundation that students need for future success. In addition to reinforcing mathematical concepts that the students have already been exposed to, course work can incorporate study skills and practice solving word problems.

The camp could be housed at NAU and open to all local students. The activities would not be limited to mathematics and could incorporate traditional camp staples, with up to 50% of the time devoted to classroom learning.

The camp counselors can be high school students who are taking advanced math courses. The counselors can be good role models to the students, as well as aides in the classroom to the teacher.

The camp can be expanded to include lab experiments into topics that interests kids (biology, aeronautics, astronomy, etc…) and then a third portion that incorporates the mathematics behind the scientific field.

* Math Competitions:

Encourage classrooms to participate in contests that use challenging, but age appropriate, word problems. In order for students to learn persistence and analytical thinking, they need practice and an encouraging environment. Classrooms could earn activities – field trips, pizza party – by a certain percentage of students submitting answers and students who do well (defined by improvement, effort, correct answers) could earn recognition. The problems could be interdisciplinary, which gives exposure to scientific concepts at the same time. The problems would require work to be shown and the degree of assistance would be limited. By not stressing correct answers, but an honest attempt, students practice important skills and can apply positive peer pressure on their classmates to do the work and not feel bad about themselves if they struggled.

* Study and Organization Skill Program for Students:

Invest in summer programs for students entering sixth and ninth grades to learn and practice study and organizational skills. Learning to start work early so that you can get help if you need it, remove distractions when studying and organize yourself so that you can access materials readily are important skills any college student needs to be successful. If the students learn the skills at a much younger age, it can help them be more efficient with their time and balance the demands of homework, extra-curricular activities and sleep. BASIS schools have offered a similar program to incoming students for several years.

Improving Professional Development:

* Math Camp w/Applied Teacher Professional Development:

The math camp described above, plus a tie into teacher training. For optimal learning on the part of the teacher, he/she spends part of the day in their professional development course and then one to two hours teaching students. The classroom time with the students can be used to hone the skills covered during their course, while receiving feedback and further instruction from a coach and the opportunity to assess what works with a learning community.

Encourage Individual Classrooms or Schools to Try New Methods:

* Reward/Incentivize whole classrooms/schools who show improvement and/or high achievement:

Rewarding a school or classroom either monetarily, with equipment or something else entirely (recognition or an activity) for improvement, and/or high performance, may not be expensive and could motivate students to improve. The method for improvement would not be proscribed, but options and resource could be made available to those that want to strive for the reward(s). This would not be a competition amongst schools or classrooms, but a reward for setting high, yet attainable, goals and reaching them.

Improve Parents Ability to be Resources:

* There was a sense that there is a significant percentage of parents who themselves struggled with mathematics and may not have the skill set or confidence to assist their children with their homework. This sometimes leads to parents allowing their children to look for an easy way out and to short circuit the learning process by not allowing them to struggle.
* Educating parents on why a strong mathematics background is important for all children, and informing them that solving difficult problems where the student can struggle is part of a good math education, can make them an important ally in our cause to improve math literacy and achievement. In addition, teaching parents proper study habits so that they can encourage those same habits in their children may help the students’ learn more effectively and efficiently at home. This information and skills could be passed to the parents through informational packets and/or sessions after school for parents and children to learn about and practice proper study skills.
* Some ways of improving the dynamic between parents and teachers were discussed. The current relationship for some teachers and the parents of their students is strained which can be detrimental to the students’ success. By engendering more explicit community support for teachers– advertising, whisper campaigns – the teachers and parents may be better able to work together for the good of the students.
* Help parents bring math into the home the way reading has been done in the past.
* Encourage parents to meet their children’s teachers in all topics. It was noted that those meetings allow the parent to connect with the teacher personally and that connection helps throughout the school year.

Grow support for the Arizona College and Career Readiness Standards:

* The new standards are very, very promising for the future of education. They are based on proven techniques and a wealth of data. Unfortunately, the transition from AIMS may be rocky and difficult for students, parents and teachers. By building support and understanding amongst the community, who are likely to see the students’ passing rate decline due to the more rigorous exams, we can provide the teachers the breathing room and encouragement necessary for them to learn and apply the new standards. How to grow the support amongst the community was not discussed in detail at the meeting.

Foster Interest in Mathematics:

* Hosting a Mathematics Bee.
* A “math festival” that was part of the larger science festival. Have a “math night” as part of the spring STEM club celebrations.
* Have a city wide celebration of Pi Day. Focus on games and activities centered on math concepts, such as Pi, for the elementary and younger ages. Include discussions and activities in Math classes at all grades regarding how Pi was determined and its implications. This can be expanded to other ratios, constants and equations that have notable influences on our lives.

Suggestions that could be Incorporated by the Schools, but Not the Community:

* Peer-to-Peer Coaching. Matching up students who are struggling with those succeeding to provide and additional resource for teachers and support for the students who need help.
* Continue to improve system for identifying, helping and tracking students who need additional help mastering concepts. A student who is struggling with reading can have their difficulties more readily diagnosed than a student who is struggling with mathematics. Improving early identification and delivering the academic support in a timely manner can keep the student from falling behind or being unduly discouraged.
* Increased frequency of one on one parent teacher meetings to discuss what to expect in terms of the students struggling

**Next Step:**

Survey! Refine details of suggestions and allow members of the community to rate the potential for each solution based on overall impact on a given student, percentage of students reached and cost (financially and resources).

**General Meeting Notes**

*Thank you to Rich Bowen and Karla Brewster for Providing a Meeting Space and Refreshments.*

Attendees from January 15th Meeting:

Mindy Bell – Flagstaff STEM Coordinator

Theresa Boone-Schuler – Flagstaff Bordertown Dormitories

Rich Bowen – ECONA and NAU

Karla Brewster – Flagstaff City Council and NAU

Erin Eccleston – Expect More Arizona

Kathy Farretta – Coconino Coalition for Children and Youth

Jane Gaun – Math education, FUSD and CCESA

April Gavin – Flagstaff Chamber of Commerce

Shannon Guerrero – Math Professor, NAU

Jennifer Hernandez – Expect More Arizona

Cindy Hester – FUSD, Flag High

Barbara Hickman – Superintendent, FUSD

Jo’el Johanson – NAU Teach, NAU

Maya Lanzetta – Math Educator, CCC

Mary Lara - FUSD

Cheryl Mango-Paget – Assistant Superintendent, CCESA

Lolita Paddock - Flagstaff Bordertown Dormitories

Kim Rimbey – Rodel Foundation

Rob Robertson – Arizona Science Center

Laura Spiegel – United Way of Northern Arizona

Mary Kay Walton – Assistant Superintendent, FUSD

Katie Warke – DeMiguel

Brandon Lurie – Flagstaff 40 Educational Task Force, BASIS Flagstaff

Meeting’s Goal:

Compile a list of programs/actions that we as a community can do to help our students reach and exceed grade level expectations. Merely reaching grade level expectations may not be enough for students to succeed post-high school.

Program:

1. Introduction and Goal (Brandon Lurie)
2. Review findings from previous meetings (Brandon Lurie)
	1. Number sense is very important to overall understanding of math concepts and many students do not have it entering middle school (fractions, negative numbers, percent, etc…)
	2. Students are looking for an expedient answer, for most math problems they encounter the information is in front of them and they just have to follow an algorithm to get there. They lack the stamina to follow through on a complicated, long problem.
	3. Common Core Standards will address a lot of issues: cohesion between subjects and concepts, teach concepts as opposed to “tricks,” reduce the amount that is covered to allow for deeper understanding
	4. Math intervention programs are hard to come by, literacy is widely available and problems are easily identifiable.
	5. Many of the students who matriculate on to college are not prepared for college level work. They suffer from poor attitude towards math, undeveloped problem solving skills and difficulty following algorithms. These are, in general, the students who met grade level expectations.
3. Breaking Down Root of Massachusetts’ Successful Math and Science Education (Cheryl Mango-Paget)
	1. State made a commitment to Pump in A LOT more money
	2. Rewrote the science & mathematics standards
	3. Implemented a more rigorous test
	4. Did not close poorly performing schools
	5. Did not fight the unions (no merit pay)
	6. Started over 20 years ago to get where they are today
4. Next Generation Science Standards – Not yet adopted as of January 15th meeting – Integration of subjects (Cheryl Mango-Paget)



1. Current Professional Development for Teachers (Cheryl Mango-Paget)
	1. A good professional development program incorporates
		1. Theory
		2. Demonstration
		3. Practice
		4. Coaching
	2. Professional development cannot stand alone
2. Available programs that could be incorporated by the community in partnership with the schools (Brandon Lurie with Assistance from Kim Rimbey)
	1. Encouraging Problem Solving Through Competition
		1. ABACUS International Math Challenge: Monthly set of problems. Students receive points, which are based on reasoning of the problem as well as getting the correct answer
	2. Organizations with Several Ready to Go Programs
		1. Arizona Science Center – Professional Learning and Development
			1. Offers Professional Development for teachers that focus on STEM training aligned to AzCCRS and the Next Generation Science Framework
			2. Organizes community and/or school wide events to incorporate parents and families into the student’s science and math education
			3. Works with teachers on in-classroom opportunities, such as Engineering is Elementary
	3. Organization that’s Provide Classroom and On-line Resources
		1. Singapore Math
		2. Camelot Learning
		3. Eureka Math – Currently Piloted in Yuma and Berkeley
	4. Community Model
		1. Zeno Math
			1. Math Clubs, Challenges between classrooms, Family Math nights, Math camps
			2. Tries to involve the whole family in the student’s education and to make math fun
			3. A not for profit looking to expand to new communities, currently based in Washington state
	5. Extra-Curricular Math
		1. Math Circles: Mathematicians and scientists meet with teachers and students in an informal setting with the purpose of getting the students excited about mathematics
	6. On-Line Complimentary Programs
		1. ST Math
		2. FASTT Math
		3. Hands-On Algebra (also has a manipulatives kit)
3. Response to Intervention for Mathematics (Shannon Guerrero)
	1. an early detection, prevention, and support system that identifies struggling students and assists them before they fall behind
	2. Diagram summarizing structure



* 1. The goal is to organize and implement “targeted” interventions using *powerful interventions* that are scientifically based.
	2. Research-Based Instructional Strategies for Elementary/Middle
	Mathematics Intervention
		1. Focus on whole numbers and rational numbers
		2. Focus on problem solving process
		3. Focus on rich word problems
		4. Focus on visual representations
	3. Tier I – All students receive Tier I, which is the classroom instruction
	4. Tier II - (Goal of 5-10% of students): Additional assistance for struggling students.
		1. Typically 20-40 minutes, 4 to 5 times per week
		2. Small group instruction to build targeted proficiencies, which can be provided within the general education classroom.
		3. In addition to Tier 1 instruction.
	5. Tier 3 (1-5% of students): Intensive assistance for students not responding to Tier 2 interventions
		1. Special education services may or may not be part of this tier of instruction
	6. Instruction during the intervention should be explicit and systematic.
		1. This includes providing models of proficient problem solving, verbalization of thought processes, guided practice, corrective feedback, and frequent cumulative review.
	7. Assessment
		1. SCREENING –
			1. Identify students at risk for learning problems or those ready for acceleration/challenge
			2. evaluations for all students 3 to 4 times a year; reliable & valid; easily scored; short
		2. PROGRESS MONITORING **–**
			1. Monitor progress of all students to further inform continued instruction and/or intervention
			2. frequent academic assessment that may be the similar to screening assessment or more classroom-based
1. Group Discussion and Brainstorming

Information Provided Prior to the Meeting:

**Research-based Parameters and Programs that Promote**

**Excellence in Math Teaching and Learning**

**Kim Rimbey, Ph.D.**

 The following review focuses on the parameters that impact the quality of mathematics classroom teaching and programs that have shown to increase levels of student learning.

**Parameters**

When reviewing the literature, conflicting reports negate one’s ability to conclusively define the physical factors that point towards optimal mathematics setting such as class size, time duration, or block scheduling. However, the literature strongly supports the notion that teacher quality matters. Research studies state repeatedly that without quality instruction, even factors such as quality curricular materials lose their potential impact. Following is a summary of several studies that were conducted in the past few years.

1. Effective instruction is as important as quality curriculum materials (Boaler, 2001; Cohen, Raudenbush, & Ball, 2000; Sanders, 1998)
2. Effective math instruction must be balanced, including conceptual understanding, procedural fluency, and reasoning and problem solving (Kilpatrick et al., 2001; U. S. Department of Education, 2008; CCSSM, 2010).
3. “There is limited evidence supporting differential effects of various mathematics textbooks. Effects of computer-assisted instruction are moderate. The strongest positive effects were found for instructional process approaches such as forms of **cooperative learning**, **classroom management and motivation programs**, and **supplemental tutoring programs**. The review concludes that programs designed to change daily teaching practices appear to have more promise than those that deal primarily with curriculum or technology alone” (Slavin & Lake, 2007).
4. In 2008, the National Math Panel released a report that consolidated forty years of math education research into a single document. Some of their conclusions follow. Note that extended reading on each of these topics, including the plethora of research evidence for each, is available in the extended version of the National Math Advisory Panel’s Reports.
	1. **A major goal for K–8 mathematics education should be proficiency with fractions** (including decimals, percent, and negative fractions), for such proficiency is foundational for algebra and, at the present time, seems to be severely underdeveloped. Proficiency with whole numbers is a necessary precursor for the study of fractions, as are aspects of measurement and geometry. These three areas—whole numbers, fractions, and particular aspects of geometry and measurement—are the Critical Foundations of Algebra.
	2. **To prepare students for Algebra,** **the curriculum must simultaneously develop conceptual understanding, computational fluency, and problem solving skills**. Debates regarding the relative importance of these aspects of mathematical knowledge are misguided. These capabilities are mutually supportive, each facilitating learning of the others. Teachers should emphasize these interrelations; taken together, conceptual understanding of mathematical operations, fluent execution of procedures, and fast access to number combinations jointly support effective and efficient problem solving.
	3. **Computational proficiency with whole number operations is dependent on sufficient and appropriate practice to develop automatic recall of addition and related subtraction facts, and of multiplication and related division facts**. It also requires fluency with the standard algorithms for addition, subtraction, multiplication, and division. Additionally it requires a solid understanding of core concepts, such as the commutative, distributive, and associative properties. Although the learning of concepts and algorithms reinforce one another, each is also dependent on different types of experiences, including practice.
	4. **Difficulty with fractions (including decimals and percents) is pervasive and is a major obstacle to further progress in mathematics, including algebra**. A nationally representative sample of teachers of Algebra I who were surveyed for the Panel rated students as having very poor preparation in “rational numbers and operations involving fractions and decimals.” As with learning whole numbers, a conceptual understanding of fractions and decimals and the operational procedures for using them are mutually reinforcing. One key mechanism linking conceptual and procedural knowledge is the ability to represent fractions on a number line. The curriculum should afford sufficient time on task to ensure acquisition of conceptual and procedural knowledge of fractions and of proportional reasoning. Instruction focusing on conceptual knowledge of fractions is likely to have the broadest and largest impact on problem-solving performance when it is directed toward the accurate solution of specific problems.
	5. Mathematics performance and learning of groups that have traditionally been underrepresented in mathematics fields can be improved by interventions that address social, affective, and motivational factors. Recent research documents that **social and intellectual support from peers and teachers is associated with higher mathematics performance for all students, and that such support is especially important for many African-American and Hispanic students**. There is an urgent need to conduct experimental evaluations of the effectiveness of support-focused interventions both small- and large-scale, because they are promising means for reducing the mathematics achievement gaps that are prevalent in U.S. society.
	6. **Children’s goals and beliefs about learning are related to their mathematics performance**. Experimental studies have demonstrated that changing children’s beliefs from a focus on ability to a focus on effort increases their engagement in mathematics learning, which in turn improves mathematics outcomes: When children believe that their efforts to learn make them “smarter,” they show greater persistence in mathematics learning. Related research demonstrates that the engagement and sense of efficacy of African-American and Hispanic students in mathematical learning contexts not only tends to be lower than that of white and Asian students but also that it can be significantly increased. Teachers and other educational leaders should consistently help students and parents to understand that an increased emphasis on the importance of effort is related to improved mathematics performance. This is a critical point because much of the public’s self-evident resignation about mathematics education (together with the common tendencies to dismiss weak achievement and to give up early) seems rooted in the erroneous idea that success is largely a matter of inherent talent or ability, not effort.
	7. Teachers and developers of instructional materials sometimes assume that students need to be a certain age to learn certain mathematical ideas. However, a major research finding is that **what is developmentally appropriate is largely contingent on prior opportunities to learn.** Claims based on theories that children of particular ages cannot learn certain content because they are “too young,” “not in the appropriate stage,” or “not ready” have consistently been shown to be wrong. Nor are claims justified that children cannot learn particular ideas because their brains are insufficiently developed, even if they possess the prerequisite knowledge for learning the ideas.
	8. **All-encompassing recommendations that instruction should be entirely “student centered” or “teacher directed” are not supported by research**. If such recommendations exist, they should be rescinded. If they are being considered, they should be avoided. **High-quality research does not support the exclusive use of either approach.** Research has been conducted on a variety of cooperative learning approaches. One such approach, Team Assisted Individualization (TAI), has been shown to improve students’ computation skills. This highly structured pedagogical strategy involves heterogeneous groups of students helping each other, individualized problems based on student performance on a diagnostic test, specific teacher guidance, and rewards based on both group and individual performance. Effects of TAI on conceptual understanding and problem solving were not significant.
	9. **Explicit instruction with students who have mathematical difficulties has shown consistently positive effects on performance with word problems and computation.** Results are consistent for students with learning disabilities, as well as other students who perform in the lowest third of a typical class. **By the term *explicit instruction*, the Panel means that teachers provide clear models for solving a problem type using an array of examples, that students receive extensive practice in use of newly learned strategies and skills, that students are provided with opportunities to think aloud (i.e., talk through the decisions they make and the steps they take), and that students are provided with extensive feedback.** This finding does not mean that all of a student’s mathematics instruction should be delivered in an explicit fashion. However, the Panel recommends that struggling students receive some explicit mathematics instruction regularly. Some of this time should be dedicated to ensuring that these students possess the foundational skills and conceptual knowledge necessary for understanding the mathematics they are learning at their grade level.
	10. Research on instructional software has generally shown positive effects on students’ achievement in mathematics as compared with instruction that does not incorporate such technologies. **These studies show that technology-based drill and practice and tutorials can improve student performance in specific areas of mathematics.** Other studies show that teaching computer programming to students can support the development of particular mathematical concepts, applications, and problem solving. However, the nature and strength of the results vary widely across these studies. In particular, one recent large, multisite national study found no significant effects of instructional tutorial (or tutorial and practice) software when implemented under typical conditions of use. Taken together, the available research is insufficient for identifying the factors that influence the effectiveness of instructional software under conventional circumstances.
5. Although no studies conclusively stated the optimal time-frame for daily math instruction, and widely-recognized rule-of-thumb is 60-75 minutes of math instruction daily in self-contained elementary classrooms. Of course, teacher quality still trumps number of minutes spent on math instruction.

**References**

Boaler, J. 2001. Pedagogy and power: Exploring the relationship between “reform” curriculum and

equity. Paper presented at the annual meeting of the American Educational Research Association, Seattle, WA.

Cohen, D. K., et al.. *Resources, Instruction, and Research*. Seattle, WA: Center for the Study of Teaching

and Policy, University of Washington, 2000.

Kilpatrick, J., et al, eds. *Adding It Up: Helping Children Learn Mathematics.* Washington, DC: National

Academy Press, 2001. Knapp, M.S., et al.. *Teaching for Meaning in High-Poverty Classrooms*. NY: Teachers College Press, 1995.

Larson, Matt (2002). *Essential Characteristics of Effective Mathematics Instruction*. Web-based article:

<http://www.eduplace.com/state/pdf/author/larson1.pdf>.

National Council of Teachers of Mathematics (NCTM). *Principles and Standards for School*

*Mathematics*. Reston, VA: NCTM, 2000.

Sanders, W.L. (1998) Value-added assessment. The School Administrator, 55(11), 24-27.

Slavin, R.E. & Lake, C. (2007). Effective programs in elementary mathematics: a best-evidence

synthesis. *Best Evidence Encyclopedia* (a free website created by Johns Hopkins University): <http://www.bestevidence.org/word/elem_math_feb_9_2007.pdf>.

U.S. Department of Education (2008). *The Final Report of the National Mathematics Advisory Panel*.

<http://www2.ed.gov/about/bdscomm/list/mathpanel/report/final-report.pdf>

A Sampling of Current Programs

Kim Rimbey, Ph.D.

**Teacher Development**: Although this group is not currently considering professional development as a primary goal, I recommend that the committee attend to the evidence that teacher quality makes the greatest impact on student learning. Therefore, even when selecting intervention or supplemental materials, an emphasis should be placed on ensuring that instruction is being delivered by qualified professionals who receive adequate training. Parameters for quality teacher development include duration (45-120 hours delivered over the course of 6-18 months), collective participation (systemic approaches ensure long-term impact); interactive opportunities (participants should experience learning through a variety of modes); content-focused learning (participants should study math content as well as pedagogical practice); and external factors (training should account for curricular materials, assessments, leadership, district culture, community culture, teacher and student presage factors, etc.). Examples of teacher development opportunities readily available to educators in the Flagstaff area include ***Intel Mathematics*** and the ***MAC-Ro Professional Learning Project****.*

***Eureka Math (Engage New York)*:** This comprehensive program, written for New York State and based on the common core math standards, is currently being piloted in Yuma, AZ and Berkeley, CA. It is considered a district-adopted program and is based on a strong best-practices research. <http://www.engageny.org/mathematics>

***Number Talks***: This simple program produced by Math Solutions offers teachers a structure that promotes mental math strategies using interactive strategies that promote higher-level thinking. Number Talks emphasizes students’ number sense for whole number and fraction operations. It is ideal for both large- and small-group instruction and includes video vignettes from kindergarten, 2nd grade, and 5th grade classrooms for teacher training purposes.

Article: <http://www.mathsolutions.com/documents/NumberTalks_SParrish.pdf>

Description: <http://store.mathsolutions.com/product-info.php?Number-Talks-pid270.html>

***ST Math*:** This online program that promotes mathematical thinking**.** Its strong research base focuses on brain research and learning theory**.** Note that this online program is extremely expensive, but many schools have found it successful, especially with struggling students. Note that it is a great supplement, but it does not replace direct instruction with a high-quality teacher. <http://www.mindresearch.net/programs/features/>

***FASTT Math*:** This research-based program provides customized math-fact practice for individual studentsin just ten minutes per day.Based on time latency and students’ typing speed,FASTT Math creates math fact practice based on individual student data before administering the next online quiz**.** The advantage to using such a focused program is that students who know their math facts very, very well are able to work on fluency with larger numbers and fractions. This program does not replace quality instruction for conceptual development or fluency practice with larger numbers and fractions, but it does help struggling students with this critical foundation piece. The online program is also expensive, but not as much as ST Math. <http://teacher.scholastic.com/math-fact-fluency/fastt-math-next-generation/>

***Hands-on Algebra:***This inexpensive program is available online or as a manipulatives kit. It focuses on the notion of equality long before students begin algebra and provides a great reinforcement for arithmetic skills and flexible thinking about numbers. Although it is limited to just work with equations, variables, and other algebra concepts, the pay-off is tremendous for students in grades 3-9. I recommend using this in conjunction with FASTT Math. <http://www.borenson.com>

**Some Additional Programs**

**Provided by Brandon Lurie and Nandor Sieben**

**ABACUS International Math Challenge**

<http://www.gcschool.org/program/abacus/index.aspx>

“Designed for students of all abilities and demonstrates that mathematical talent can be simulated and developed through individual attention, instant feedback and challenging subject matter with flexible levels of difficulty.”

Three age groups: 3rd/4th graders, 5th/6th graders and 7th/8th graders

Monthly set of eight challenging problems. Students need to solve problem and show reasoning. Student’s receive help and points based on answer and reasoning. Top performer’s receive a plaque.

An example problem from last year’s 3rd/4th grader group:

*As he was traveling, Gulliver always loved to watch the animals playing in the ocean. One day he saw sharks on the West side of the ship, dolphins on the East side, and swordfish on the North. How many of each of these animals did he see if he saw a total of 54 dolphins and swordfish, a total of 35 swordfish and sharks, and a total of 49 sharks and dolphins?*

**Math Circles**

http://www.mathcircles.org

“…A form of education enrichment and outreach that bring mathematicians and mathematical scientists into direct contact with pre-college students. These students, and sometimes their teachers, meet with mathematical professionals in an informal setting… The goal is to get the students excited about the mathematics, giving them a setting that encourages them to become passionate about mathematics.”

**Alcumus - From The Art of Problem Solving**

<http://www.artofproblemsolving.com/liz/Alcumus/index.php>

“Alcumus offers students a customized learning experience, adjusting to student performance to deliver appropriate problems and lessons. Alcumus is specifically designed to provide high-performing students with a challenging curriculum appropriate to their abilities.”

Many videos that student’s or parents or teachers could use to explain or clarify mathematical rules or techniques.

**Beast Academy**

[www.beastacademy.com](http://www.beastacademy.com)

Provide textbooks, materials and on-line content for 2nd to 5th graders. Materials are aligned to the 2010 Common Core standards

**Zeno Math**

[www.zenomath.org](http://www.zenomath.org)

http://zenomath.org/wp-content/uploads/2013/10/Zeno-Info-Sheet-2013-14.pdf

“…a non-profit organization, believes that with the self-confidence and skills gained by experiencing math in unique and unexpected ways, a person’s possibilities are infite. Our games and programs re-frame math as fun and relevant so that all kids, teachers and families can build math confidence and lifetime skill.”

Offer math clubs, monthly math challenges between classrooms, family math nights and programs for mathematicians to work with teachers on modeling new and exciting ways of teaching math. Also offer summer math camps and math festivals.

**Singapore Math**

[www.singaporemath.com](http://www.singaporemath.com)

From Wikipedia: “…a teaching method based on the national math curriculum used for kindergarten through sixth grade in Singapore. It involves teaching students to learn and master fewer mathematical concepts at greater detail as well as having them learn these concepts using a three-step learning process. The three steps are concrete, pictorial, and abstract. In the concrete step, students engage in hands-on learning experiences using concrete objects such as chips, dice, or paper clips. This is followed by drawing pictorial representations of mathematical concepts. Students then solve mathematical problems in an abstract way by using numbers and symbols.”

The company offers textbooks and resources for all grade levels. Some, if not all, are aligned with the Common Core Standards.

For an older article about the introduction of the Singapore Math to a NJ school:

<http://www.nytimes.com/2010/10/01/education/01math.html?_r=0>

**Camelot Learning**

[www.camelotlearning.com](http://www.camelotlearning.com)

“Camelot Learning’s Math Intervention Curriculum for students in grades pre-K through 9 provides a skill-based, manipulative-rich “non-computer” learning environment. The research-based curriculum is designed to help students, especially reluctant learners improve their math skills. In fact, Camelot students perform 30% better than peers on standardized tests. Our patented lesson plans are correlated to Core Standards and NCTM Standards, and can be used during the school day, after school or in summer learning programs.”

Curriculums include scripted 40-minute lesson plans, student workbooks and manipulatives for each student.