

Academic Turnaround - Mathematics

“Do ONLY What Matters!”

*A Guide to Rapidly Raise Arithmetic Student
Outcomes for Low, Medium and High
Socioeconomic Elementary School Settings*

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Executive Summary

There is an old adage that states, “*What is the difference between a goal and a dream?*” The answer to the question is ‘**a plan.**’ In fact, ‘**a structured and empirically-proven plan**’ is a better response. Of course, this outcome-based situation typically applies to many human activities – like physical fitness, retirement planning and professional task completion – to name a few.

This white paper details a precise methodology for students to both master math facts and math processing skills as well as achieve between 90 and 100 percent passing rates on standardized state assessments in one school year. It describes a four-step program design in a typical 90-minute math block. The four (4) sections include a global numeracy program for both math facts and math processing skills, a spaced repetition component, the standard 45-minute core daily lesson and a problem-solving segment.

One of the keys of success in public school academic reformation is streamline and implement the necessary program elements – **the ones that actually make a difference in student outcomes**. There can be no sacred cow curriculum programming where school personnel continue to employ a curricula programming element that has no overall effect on student outcomes because ‘they have always done it’ or ‘it is a pet program of the school’s administration.’ In short, the school’s administration must implement effective and efficient programming so **all** students receive an equitable mathematics’ foundation in arithmetic that adequately prepares them for higher level math courses in middle and high school – and university.

The short white paper delves into each of the four (4) components, and it is intended to be used as a **guide** so campus educators can eliminate the mathematics equity issues between low income and high-income public schools. Each of the four (4) components are stated below as well as the essential reasons for its inclusion.

1.) A school-wide numeracy skills program: Use **Formative Loop** daily numeracy for the following reasons:

- a.) It is inexpensive – only \$7 dollars per student as of this writing.
- b.) It focuses on **both** math facts and math processing skills.
- c.) It has a physical writing component, so students (psychometrically) store the skill in long-term memory.
- d.) Teachers of any experience level are immediately able to implement it successfully. It is also recommended that an instruction specialist and/or administrative personnel check and enter the daily assessment results to heighten overall quality controls and relieve teachers of the daily maintenance.
- e.) It focuses on current grade level skills while simultaneously addressing and eradicating prior grade level numeracy skill gaps in its program sequencing design.
- f.) It targets **each** student individually, so ALL students do well when either the administration or classroom teacher monitors students’ daily progress.
- g.) It possesses an on-line resource library so teachers have ample resources to download for extra homework or interventions, as needed.
- h.) It has a structured ‘build-up’ math fact program for all four operations, so **all** students are able to master their math fact operations by the end of third grade.
- i.) It allows monitoring of each student’s progress in real time so that all students are pressed to grade level skill ability.
- j.) The program’s functionality allows the creation of unlimited classes for intervention or to differentiate instruction for students receiving special education services or students in a talented and gifted program.
- k.) Its math processing skill sequencing can be synced with both the spaced repetition instruction and the daily core lesson for symbiotic learning and alignment purposes.
- l.) Student disruptions are greatly reduced since students are pressed to grade level mathematics, and they can engage appropriately in the daily core lesson content.

2.) Spaced Repetition (Instruction) should be employed at the beginning of the core lesson because:

- a.) It provides the classroom teacher to spiral instruction in a sequential and logical manner.
- b.) It affords that each student exceeds the threshold number of skill repetitions to procure student mastery.
- c.) It is the most efficient type of guided math instruction pedagogy since all students are engaged simultaneously with immediate accountability.
- d.) It affords the teacher to review core lesson content or prior grade level content to mastery in real time.

- e.) It is dynamic and engaging so students of all ability levels are engaged.
- f.) It provides the teacher the option to pre-teach important content and skills to prepare students for an upcoming mathematical process (e.g., LCDs for adding/subtracting unlike fraction denominators).
- g.) The teacher can transition the daily spaced repetition exercise to a measurement warm-up unit, for example, or prepare students for the format of digital standardized assessments in real time.

3.) The Daily Core Lesson attributes include:

- a.) Classroom teachers and elementary schools may select their own Tier 1 curriculum – the other three (3) components are agnostic to the adopted daily core curricula.
- b.) Teachers design their own daily lesson individually or in a team planning session with standard nightly homework procedures.
- c.) The lesson should be mainly math processing skill-based in a sequential and developmental lesson.

4.) A Problem-solving resource should be a separate daily learning/engagement session that:

- a.) Provide students application exercises that meet grade level standards (TEKS/CCSS, etc.) expectations.
- b.) Educators of any experienced level can use the daily resource with immediate efficacy.
- c.) The infamous achievement gap is actually a skill gap. The problem-solving resource is an application of the mastered grade level skills, and the daily resource is aligned to the Tier 1 core curriculum.
- d.) The resource is spiral bound so teachers planning time is greatly minimized.
- e.) Instruction should begin with a paper-pencil resource so students establish a solid problem-solving strategy. Then, teachers can smoothly transition established strategies to a digital environment.
- f.) The resource provides a running record for monitoring purposes and parent-teacher conferences.

If the campus administration opts to supplement a digital-based visual only numeracy-based program, the performance results will be much lower than the 90 to 100 percent meeting standards on standardized tests. Formative Loop's written assessment as well as its control features and functionality dramatically affect student outcomes since all students are pressed to grade level. The same is also true for the other two elements, spaced repetition and the problem-solving resource, but for differing reasons. Spaced repetition is highly efficient and effective on preserving instructional minutes of the 90-minute block, and the problem-solving resource affords standardization horizontally, as well vertically at the campus. These aspects are instrumental in heightening student performance and mitigating any adverse effects due to novice educators' pedagogical inexperience.

A majority of students will automatically excel at the campus and be pressed to grade level by simply implementing the four (4) part curricular program. However, approximately 40 percent of students will need encouragement, motivation and assistance to reach the same performance levels. The numeracy program (Formative Loop) will readily identify those students by their slower progress, and it will also indicate students that may have disabilities that require formal diagnostic evaluation. It is these efforts by the classroom teacher, instructional personnel and the campus administration that will make the academic difference for all children. Moreover, these efforts dramatically build a strong relationship with this group of students. The extra attention and motivation implicitly and explicitly convey to struggling academic students that this math content is important to learn, and that they will not be conveniently ignored by sitting quietly in their classroom.

After one school year of concerted effort, the mass of students is capable of grade level mathematics. Moreover, the Tier 1 curriculum works as it was designed since students do not possess prior grade level skill gaps, and the instructional and resource system is easy to maintain and high academic performance is achieved school year after school year. However, a school-wide instructional system and program is required, and it is important to note that only the campus administration possesses the influence and authority to implement global curricular systems. In the end, the administration and instructional staff must be willing to expend the necessary effort.

Finally, the four (4) part mathematic program described in this white paper has produced multiple National Blue Ribbon Schools as well as National Blue Ribbon Profile Schools by the United States Department of Education in challenging, urban Title 1 elementary schools after only one school year of implementation. It is not poverty or funding issues that drive low academics in our public schools. Chronic academic performance is invariably due to campus and central office administrators' inability to implement effective instructional methodologies and curricular resources that directly address their children's academic numeracy skill gaps.

A Guide to Academic Turnaround (MATH) – Do ONLY What Matters!

By Blaine Helwig

I notice the new people working out in the gym each January after the New Year begins. To their credit, they are trying to better their physical shape for health and aesthetic reasons. The mass of New Year Newbies spend an hour to 90 minutes at the gym, but in the long-run, few achieve positive and desirable results. *Why?* Because they engage in physical activities and regimens that do NOT produce the results, they so badly desire. Without a doubt, they are very busy at the gym, but one cannot confuse physical motion with highly specific exercises and habits that must be practiced to procure favorable results. Unfortunately, after about a month and a half of non-purposeful workouts, I never see them again.



As my father told me when I was a teenager, “*There are a thousand ways to do a job incorrectly. However, it takes a select few things properly done consistently to get a task completed correctly.*” Academic turnaround of Title 1 elementary schools is analogous to my father’s thinking, and that is a major reason why effective reform does not occur except in a select number of isolated public schools. Principals and classroom teachers engage students all day long, albeit both inefficiently and ineffectively; thus, at year’s end, their campus’ academic performance does not improve significantly from previous school years.

So, let’s dispense with the thousand misses and hit a bullseye, the first time for arithmetic mathematics mastery. Words to the wise educator – *heightened performance on any human task requires ‘know-how, commitment and consistency.’*

Heightened Mathematics Performance at ANY Elementary School

There are only four (4) essential components to a daily 90-minute math arithmetic lesson from first grade through sixth grade. All four (4) components are important – and in this streamlined math block model, the classroom teacher retains the freedom to design their own core lessons that aligns with their pedagogical style.

ONE – Daily Numeracy (5 or 10 minutes Daily)

A daily schoolwide numeracy program is key to performance, and is pivotal for the campus administration to understand that this part of the arithmetic mathematics’ programming CANNOT be accidental in design. The Tier 1 curriculum used in the core lesson ASSUMES that students have no prior grade level academic skill gaps, but they do! These numeracy skill gaps must be directly addressed or the child is not prepared for dependent grade level math facts, processing skills or problem-solving exercises. The worst aspect is that students’ numeracy skill gaps are not uniform. The prior grade level numeracy gaps for each student are so diverse that classroom teachers would require an elaborate tracking and accounting scheme to monitor and address so many different variants.

Fortunately, the Formative Loop (FL) numeracy program digitally handles all the numeracy accounting for the classroom educator. Moreover, Formative Loop is a numeracy program that addresses both math facts and processing skills for BOTH the current grade level and the prior grade level, simultaneously for each student. By implementing the Formative Loop numeracy program, students’ numeracy issues are addressed concurrently for multiple grade levels. If the numeracy program is implemented with daily urgency and accountability, then EVERY student’s academic needs are pressed to grade level. Formative Loop is a hybrid program requiring students to physically WRITE their 5-minute individualized daily assessment, and the outcome inputted and recorded in the program. Then, each student is provided extra practice if they are unsuccessful (as well as an intervention, if needed), or conversely, a student is moved to the next skill level if

mastery is demonstrated. Individualized homework is automatically generated for the student based on their assessment. Moreover, classroom teachers have access to an on-line Formative Loop ‘Resource Library’ that includes all grade level skills for extra practice or homework for 1st through 8th grade students. Note/Tip: It is recommended to assess students at the onset of the instructional day, and save math block minutes.

It is important to note that the infamous ‘achievement gap’ is actually a skill gap in both math and literacy. Those academic skill gaps must be addressed and eradicated, or students rarely, if ever, academically catch-up as they transition to succeeding grade levels school year after school year.

Recommended white papers for further reading to fully understand the process – are available for free download at the website address provided in the footer of this document:

- [“Math Fact Mastery – ‘Easy to Do!’”](#)
- [“Writing – ‘An Overlooked Learning Modality.’”](#)

Recommended Blogs for further reading – available at the website address provided in the footer:

- Academic Gaps – Each Teacher Can’t Do It Alone!
- Math Stamina Test Issues – Numeracy to the Rescue
- Preventing Numeracy Gaps from Forming
- It’s the Gaps Stupid – Part 1
- It’s the Gaps Stupid – Part 2
- What Does Numerical Fluency Mean?

TWO – Spaced Repetition (5 to 10 minutes Daily)

Spaced repetition is an instructional technique that solves the minimum threshold number of learning repetitions required for students to achieve mastery of a skill or process. It is a dynamic instructional process at the beginning of the 90-minute core math block for approximately 5 to 10 minutes. Students are sequentially exposed to grade level skills in a rapid review (spiraling) session, so ALL students possess mastery over grade level curriculum. This added instructional system is implemented symbiotically with the Formative Loop daily numeracy program. Both systems rapidly eradicate the prior grade level skill gaps, as well as press student accountability of all content as prescribed by state mathematics standards.

There are specific skill guidelines outlined from first through fifth grade available for free download under the ‘expertise resources’ tab at the website address provided in the footer. The downloadable resources are all referenced by grade level and entitled “Math Spaced Repetition Outline/Planning Guides.”

Recommended white paper for further reading – available for free download at the website address provided in the footer of this document:

- [“Spaced Repetition System \(SRS\) – ‘General Math Skill Mastery’”](#)

Recommended Blogs for further reading – available at the website address provided in the footer:

- Repetition and Practice – Necessary for Student Learning
- Achievement Gap Won’t Close – Fix the Skill Gap and Gaps Be Gone!
- Student Skill Mastery – Spaced Repetition Instruction
- Spaced Repetition! A Game Changer in Student Learning

THREE – Daily Core Lesson (45 minutes Daily)

The daily core lesson is a traditional math element that requires between 45 and 50 minutes for elementary aged students. The Tier 1 curriculum selection is a school or district choice; however, the daily core lesson

should be primarily skill based (e.g., place value, rounding, single and multi-digit math computations, fractions, decimals, etc.). A classroom teacher and/or the grade level team have the freedom to sequentially design and implement these lessons at every grade level. In short, the other three steps (i.e., Daily Numeracy, Spaced Repetition and Problem Solving) are supplemental add-ons to the adopted core (Tier 1) curriculum. In doing so, those three (3) add-ons are agnostic to any school or district adopted Tier 1 mathematics curriculum.

It must be emphasized that the achievement gap in actuality is a math fact and processing skill gap. The recognition of this fact is of key importance, since it is possible to directly address the math fact and processing skill gaps for prior grade levels; thus, students simultaneously master current grade level skills using this four (4) pronged approach. However, the following classroom dynamics must be omnipresent if heightened student learning outcomes are the desired goal: student accountability and verification of mastery of skills, relational teachers in the classroom, sound teaching practices (e.g., gradual release instruction and sequencing of skill lessons from concrete to the abstract), and effective classroom management with efficient daily procedures to preserve instructional minutes. In short, these essential educational classroom dynamics and systems promote and support the learning objective of the four (4) elements of the daily 90-minute math block.

Recommended Blogs for further reading – available at the website address provided in the footer:

- Effective Daily Class Management – Come Rain or Shine
- Kinesthetic Vocabulary Learning – Math and Science Block
- Mathematics Vocabulary – A Necessary Addition
- Classroom Relationship Building – Bridging the Divide of Trust is Paramount!
- Learning and Growth in Small Chunks
- Student Engagement – Active Versus Passive Learning
- Music and Athletics – Lessons to Emulate in Skill Mastery
- Align, Teach, Practice and Do Well!
- Why is Teaching Children so Difficult?
- Beginning Teachers – When and When NOT to Use Manipulatives.
- Manipulatives, Pictorial Representation – then, Paper-Pencil
- Avoiding Self-Inflicted Professional Wounds

FOUR – Problem Solving (20 to 30 minutes Daily)

It's easiest to use a separate, but well-designed and standards aligned, sequenced problem-solving curricular resource for word/story or critical thinking problems for a number of reasons. First, the resource standardizes problem solving expectations to state standards horizontally and vertically across grade levels. Second, teacher planning and preparation time is dramatically diminished. Third, if a grade level resource is used that is bounded, then there is a documented running record of student use over weeks and months that is easy for administrators to monitor classroom teacher implementation when they were not present in the classroom. Fourth, standardized tests are primarily word or story problem based; thus, students are practicing that level of expectation every day. Lastly, teachers can use the bounded document to show parents their children's problem-solving ability and application growth in conferences, as needed.

It is important to note the need for teacher modeling of these resources for at least 6 to 8 class days, so students solve problems and show their work with regard to those expectations. It is also recommended that the teacher walk around and check each student's work as the child completes it. This monitoring process accomplishes two important elements in learning. One, the teacher is aware of the how (i.e., quality of work) their students are solving problems with regard to accuracy, and that students' work meets their established expectations. Two, students are being held accountable, and they are abundantly aware that their teacher is checking their work product for quality. Three, the teacher does not have to check an entire exercise of 6 to 9 problems for

each student at the end of the day or lesson, eliminating a tedious daily process. Additionally, the classroom educator can end the 90-minute block with a quick review of any common areas where students demonstrated a lack of conceptual or skill understanding.

Many standardized tests are now a digital medium; however, it is highly recommended that during the fall semester teachers employ a paper and pencil curricular resource to better control the learning process. In general, it is much easier to create and control a sound problem solving process with students on paper-pencil than on a digital system. During the spring semester, teachers can easily transition from a structured paper pencil resource to a digital assessment process to ensure students are familiar with the digital assessment medium. Finally, [Amara4education](#) resources provide a sound paper-pencil resource aligned with state standards (CCSS or TEKS). Note: I refer to these grade level curricular resources as ‘Bridge Resources.’

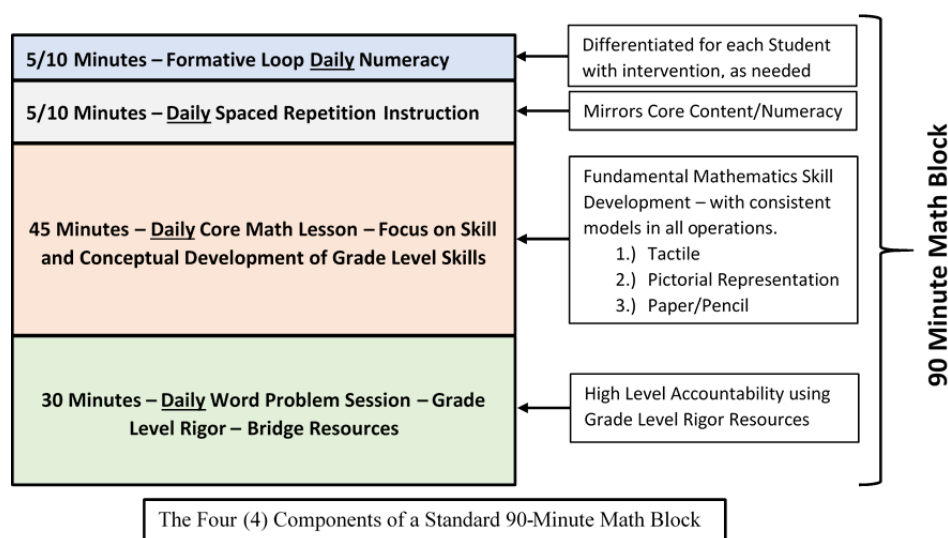
It is important to note that the four (4) pronged 90-minute math block is a layered and dependent instructional system. A classroom teacher needs sound instructional practices in each of the four (4) components. If not, overall performance will be lowered for a significant number of their students. For instance, if students are pressed to grade level with both math facts and math processing skills, but the problem-solving resource is not aligned to state standards or there is poor student accountability during the problem-solving practice sessions, performance will be depressed. In this case, it is highly probable that between 25 to 50 percent of the students will **not** pass a standardized grade level assessment despite being skill-based ready.

Recommended Blogs for further reading – available at the website address provided in the footer:

- Why Students Can’t Problem Solve without Numeracy Skills
- Bridge Resources and their Academic Need
- Math Word Problems, Skills and Practice: In this case, it takes Three to Tango!
- Problem Solving – Not Learned by Discovery
- Word Problems: Student Benefits and Teaching Tips
- Transitioning to the Digital/On-Line Test World

Concluding Thoughts and WHEN Performance is Achieved

The elementary 90-minute math program described above is intended for a global, schoolwide instructional math system at any type of traditional or charter elementary school – Title 1 or non-Title 1. Thus, the school’s administration must be fully committed to implement and assist in the eradication of students’ academic numeracy gaps.



At my urban, Title 1 elementary school, Formative Loop was implemented for both a math fact and a math processing skill assessment each day – two five-minute assessments. Each school day, I personally checked and entered the 3rd grade mathematics’ daily assessments, and I monitored and encouraged every third grader until 97 percent of the students mastered both math facts and processing

skills every school year. The fourth and fifth grade Formative Loop daily assessments were checked and entered by our math specialist, but as the principal, I monitored each newly enrolled student in the upper

intermediate grades until they also met grade level mathematics skills. **Why?** I was a structural engineer by both university education and professional work experience. I knew that grade level numeracy was key to eliminating the achievement gap; consequently, our campus' math performance was consistently ranked in the top 5 percent of all socioeconomic elementary schools in the State of Texas for thirteen (13) consecutive years. Our elementary school was also selected as a National Blue Ribbon School and a National Blue Ribbon Profile School by the United States Department of Education.

There are additional benefits of eradicating the numeracy skill gaps. First, the Tier 1 core curriculum works as it is designed since it **assumes** students do not possess skill gaps. However, after the program is implemented and pressed, they no longer possess those numeracy gaps. Second, students are educationally prepared to engage in the core daily math lessons, and student misbehavior and disruptions are significantly minimized. Third, once the majority of students are on grade level for both skill based and problem solving, teachers of any experience level are successful. Fourth, a school's academic math performance of challenging Title 1 elementary schools match those of non-Title 1 elementary schools – and equity and opportunity for all students is realized. Fifth, students transition to middle school on grade level; thus, tutoring and interventions are isolated to grade level content in sixth, seventh and eighth grades. In short, grade level numerate students enter middle school academically prepared for algebra, geometry and trigonometry. Moreover, students must be prepared for university math and science success. In the spring of 2023, the top forty (40) most lucrative annual salaries for university students graduating in May, 2023 were all STEM (Science, Technology, Engineering and Mathematics) professional fields.

If this 90-minute math program is implemented and pressed, within one (1) school year, desired academic results can be achieved. However, there can be no sacred cows in curriculum. Ineffective curricular programs should be discontinued immediately. A curricular program must demonstrate performance to justify inclusion in the classroom. If not, these programs will dilute the entire process both by inefficiency and ineffectiveness. It is highly recommended not to 'throw good money after bad.' The cost of poor curricular programming and instruction drives a lack of educational opportunities when our students graduate high school, and a woefully prepared STEM work-force that is needed today is an enormous macroeconomic cost for society to absorb.

In conclusion, the administration must be willing to put the work and effort in to leading their staff in decision making and instruction. In short, a principal and the entire instructional team must be **active** instructional and servant leaders. Moreover, this group of educators must support teachers instead of leaving inspirational notes and small recommendations upon classroom observation visits. Otherwise, students possess the same numeracy skill gaps when the campus administration and instructional team exit the classroom as they did when they walked in. In a word, school leadership personnel must be personally willing to put in the work and effort, and implement instructional curricular resources and methodologies that actually make a difference in student outcomes.

Recommended white paper for further reading – available for free download at the website address provided in the footer of this document:

- [“The 90-Minute Math Block – Putting all the Pieces Together.”](#)
- [Solving the Mystery of Poor Math Performance](#)
- [So, You Want to be a Principal?](#)

Recommended Blogs for further reading – available at the website address provided in the footer:

- Instructional Coaches – What do they do all day?
- The Accidental Principal