EFFECTIVENESS OF PROGRESS MONITORING AND FORMATIVE ASSESSMENT: Empirical Evidence

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Context

- Progress Monitoring and formative assessment are among the most critical practices in the DBDM and Accountability domain of the NASP practice model

Context

- With RTTT funding of Smarter Balanced and PARCC Assessment consortia there is the added requirement that accountability measures be technology-based.

Context

- The requirement is for use of computer adaptive tests to measure general outcomes (as part of state and district accountability assessments) and concurrent use of technology-enhanced systems to monitor student achievement and use of data to plan instructional interventions).

The Difficult Task

- A major bottleneck to improving teaching and learning is lack of information on individual student progress at the classroom level

A Fundamental Assumption

- If teachers could monitor instruction (or get the assistance they need in order to do so), could gather or be given the data they need to individualize instruction, and knew how to incorporate evidence-based principles of effective instruction, both level and rate of student performance would improve.

Argument

- There is no need for them to do this on their own. There are technology-enhanced progress monitoring and information management systems that will do the work for them, and will do so on an entire classroom level or on an individual tier 2 or tier 3 level

A Test of the Assumption

- I describe several key investigations my colleagues and I conducted over a 15 year period and published in peer-reviewed journals in school psychology or related disciplines.
- I summarize key findings of those investigations and review lessons learned.

Why Accelerated Math?

- AM is a technology-enhanced progress monitoring and instructional management system that can be used with any curriculum to enable teachers to make decisions about what to teach, and to use data on student performance to modify or adapt their instructional approach (individualize instruction)

Why Accelerated Math?

- AM incorporates what we know about effective instruction (e.g., match, feedback, engaged time) into progress monitoring so one has both a progress monitoring and instructional management system

How AM Works

- Technology-enhanced monitoring system
- Used with any existing curriculum
- Students are pre-tested using STAR Math and instruction and practice are matched to their level of skill development (ZPD).
- Keeps track of individual students' daily activities
- Provides immediate feedback to students and teachers through individual or class diagnostic reports

How AM Works

- Alerts teachers when students are having difficulty with specific assignments and provides enables adaptive instruction
- Monitors student achievement and gives teachers the information they need to differentiate and adjust instruction

AM Steps

- Students are given problem sets to practice with or without teacher or peer assistance, record their answers on a scan sheet, and scan their work at a computer work station.
- AM software instantly scores, records student performance, updates teacher record books, creates teacher reports, creates immediate student feedback reports, and generates next assignment.

AM Steps

- Mastered objectives are spiraled back for immediate skill maintenance and “banked” for testing student competence. Non-mastered objectives are paired with new objectives for additional practice and instruction.
- Teachers receive daily a “status of the class” report showing specifically where each student is in math instruction. The report “flags” students experiencing difficulty and indicates places to intervene.

Our Studies of the Accelerated Math Technology-Enhanced Progress Monitoring System

Studies

- Mandated summer school
- One year investigation of effectiveness of progress monitoring/instructional management system.
- One year investigation focused on changes in classroom ecology (quantitative and qualitative changes) using E-BASS and TIES-2

Studies

- Six month examination of effects of intervention integrity
- Five month experimental study (Ysseldyke & Tardrew)
  - 2202 students enrolled in 125 classrooms (67 experimental and 58 control) in 47 schools in 24 states
    - 1072 Experimental
    - 1130 control

Studies

- Subgroup analyses comparing gifted/talented to non-gifted/talented and Title I to non-Title I.
- Two year randomized-control experiment (Ysseldyke & D. Bolt) in 133 classrooms in 9 schools, in 8 districts in 8 states)
  - 2645 students in experimental group

Studies

- Study of the relationship between gains on progress monitoring measure and performance on a state accountability test

Studies

- Two year investigation of variability, sustainability and implementation integrity (D. Bolt, Ysseldyke & Patterson) among teachers. 1,397 students in classrooms of teachers who implemented the program over two years.

What We Learned

- Students who had failed state and district tests and attended an intensive summer school program gained more in 6 weeks than in the previous entire academic year (5.75 NCE).
- Across all studies students who participated in AM gained significantly more than those who did not as assessed by multiple math measures (STAR Math, NALT, Tera Nova, MBST).

What We Learned

- Low-, middle-, and high performing students who participate in AM significantly outperform those who do not.
- Application of AM results in significant positive changes in the instructional ecology (more cognitive emphasis, individual instruction, informed feedback, increased monitoring of student performance and progress, more adaptive instruction, etc.)

What We Learned

- More active academic responding and less task management time as measured by ecobehavioral assessment instruments (E-BASS).
- Intervention integrity is critical. When teachers implement the program as intended, gains are far greater than when this is not the case.

What We Learned

- At grades 3, 4, 5, and 6 students in classrooms in which teachers used AM gained significantly more in math than in control classrooms ($p < .05$)
- At grades 7-10 students in experimental group out-performed those in the control group, though not significant

GE and Percentile Rank Gains

- At every grade there were large differences in grade equivalent score and percentile point gains between students in the experimental and control groups

Additional Findings

- Gains were consistent across low, average, and high-performing groups
- There was considerable variability in student performance
- Level of implementation had a definite, significant effect on gain in math performance across the entire sample

Additional Findings

- There is a strong positive relationship between gains on a progress monitoring measure (AM) and performance on a state accountability test.

Additional Findings

- Considerable variability among teachers in their implementation of the program
- Teachers were able to sustain the program over a two year period of time
- When teachers implemented the program with integrity over two years gains were highly significant

What Can One Expect When AM is Implemented With High Fidelity?

Table 7: Average Gains for Spring Semester for Students with >85% Correct on Accelerated Math Tests

	Grade				
	3	4	5	6	7 and 8
NCE Gain	9.8	9.3	9.3	8.5	6.2
SS Gain	72.2	66.7	61	62.2	40.3
Percentile Gain	11.4	12.2	10.6	9.7	7.1
GE Gain	1.1	1.3	2	2	1.3
Objectives Mastered	75	57	87	60	52

Table 9: Comparison of Average Gain for Spring Semester for High Implementing Students and Control Students

		Pre	Post	Gain	Difference	*p*
SS	Control	654.0	684.9	30.9	49	<.001
	AM High	656.5	736.4	79.9		
NCE	Control	52.8	53.8	1.0	11.4	<.001
	AM High	60.0	72.4	12.4		
Percentile	Control	55.0	57.0	2.0	16	
	AM High	68.0	86.0	18.0		
GE	Control	4.8	5.3	0.5	1.1	
	AM High	4.8	6.4	1.6		

Subgroup Analyses

- Gifted and Talented
  - GT students in AM gain significantly more than GT students not in AM (STAR Math)
  - Considerable variability in implementation factors

Conclusions

- Use of a continuous progress monitoring and instructional management system significantly enhances instructional outcomes in math.

Conclusions

- High amount of non-implementation. It is imperative to monitor intervention implementation.
  - Shmoker notes that teachers are confronted with “initiatives du jour”, and unless there is explicit monitoring of implementation and some reward for doing so, teachers do not do so.

Conclusions

- High amount of non-implementation. It is imperative to monitor intervention implementation.
  - Goodlad noted that “Innovation is not enough, behind the classroom door even teachers who think they are implementing an innovation are often only twisting it right back into what they have always done” (p. 72).

Follow-up Question or to Request More Information Send an Email to :

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