



Improving the Efficiency and Effectiveness of Instruction with Progress Monitoring and Formative Evaluation in the Outcomes Driven Model

Roland H. Good III, Ph.D.
Dynamic Measurement Group, Inc.
University of Oregon.

Cognitive and Neurocognitive Aspects of Learning:
Abilities and Disabilities
International Conference
May 19 – 21, 2015

DIBELS®, DIBELS Next®, and Pathways of Progress™ are trademarks of Dynamic Measurement Group, Inc.

5/19/2015

©2015, Dynamic Measurement Group, Inc.

1



Agenda

- Rationale for progress monitoring and formative evaluation
- Ordinary least squares slope of progress
- Issues with slope
- Student Progress Percentiles: Pathways of Progress™
- Results
- Discussion

5/19/2015

©2015, Dynamic Measurement Group, Inc.

2



What is progress monitoring and formative evaluation?

To implement progress monitoring, the student's **current levels of performance** are determined and **goals are identified** for learning that will take place over time. The student's academic performance is **measured on a regular basis (weekly or monthly)**. Progress toward meeting the student's goals is measured by **comparing expected and actual rates of learning**. Based on these measurements, **teaching is adjusted** as needed. Thus, the student's progression of achievement is monitored and instructional techniques are adjusted to meet the individual students learning needs.

<http://www.studentprogress.org/progresmon.asp#2>
Accessed: 1/22/2015

5/19/2015

©2015, Dynamic Measurement Group, Inc.

3



John Hattie (2009) evaluated more than 800 meta-analyses of 138 influences on student achievement:

- Student
- Teacher
- Teaching
- Curricula
- School
- Home

Influences on achievement we can do something about.

5/19/2015

©2015, Dynamic Measurement Group, Inc.

4



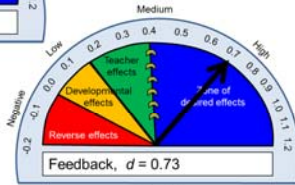
Selected Hattie (2009) Findings...

Desirable *Goals* are:

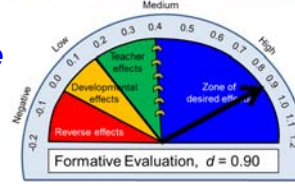
Meaningful,
Attainable,
Ambitious



Feedback to teachers & students:
Is what we are doing working?



Progress Monitoring and Formative evaluation is the 3rd largest effect on student achievement out of 138 possible influences.



5/19/2015

©2015, Dynamic Measurement Group, Inc.

5



Defensible Progress Monitoring Requires...

- An interpretive framework within which to determine if progress is adequate or not.
- Accurate measurement at the individual student level
- Progress decisions that demonstrate:
 - ✓ reliability (decision stability)
 - ✓ evidence of validity (including decision accuracy)
 - ✓ appropriate normative comparisons
 - ✓ decision utility (result in improved outcomes)

5/19/2015

©2015, Dynamic Measurement Group, Inc.

6



Progress Decisions in an Outcomes-Driven Model

- ▶ Outcomes Driven Model Steps:
- ▶ Identify need for support.
- ▶ Validate need for support.
- ▶ Plan and implement support.
- ▶ Evaluate and modify support.
- ▶ Review outcomes.

Progress decisions assist in *setting goals* and *evaluating progress*.



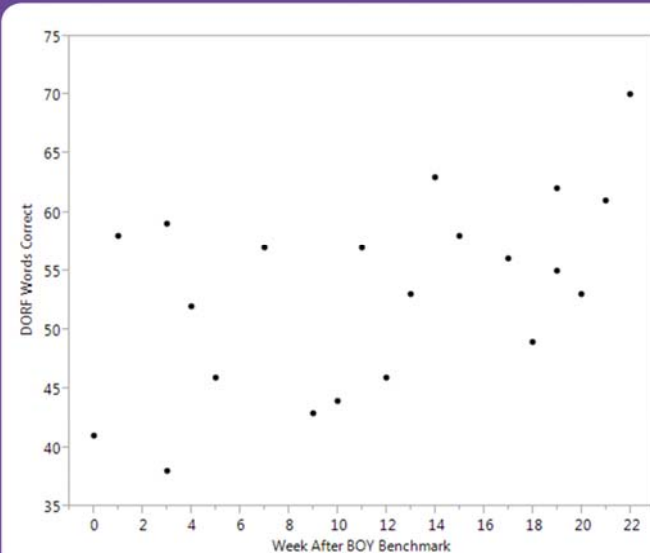
5/19/2015

©2015, Dynamic Measurement Group, Inc.

7



Student Progress Decisions Example: Ryan



• DIBELS Oral Reading Fluency

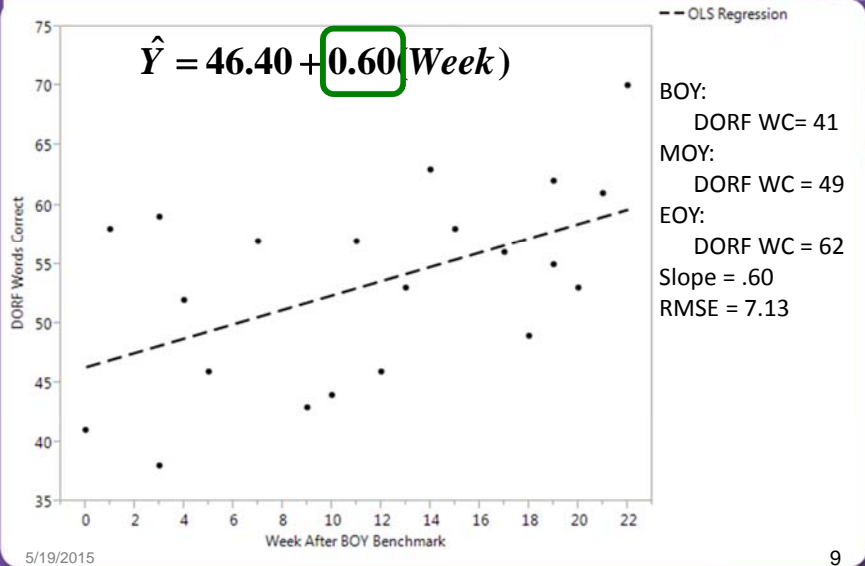
5/19/2015

Week After BOY Benchmark

8



Slope of Student Progress: Ryan



Study 1 Descriptive Statistics

Descriptive Statistics for DIBELS Next Oral Reading Fluency-Words Correct by Number of Weeks and Number of Progress Monitoring Assessments

Subset of data	N	Number of progress monitoring assessments				BOY DORF Words Correct	
		M	SD	Min	Max	M	SD
All students	151,138	8.72	4.75	2	59	68.93	32.86
6 weeks, 5+ points	6785	5.62	0.95	5	16	48.62	22.65
10 weeks, 9+ points	2813	9.72	1.2	9	22	46.47	20.69
14 weeks, 13+ points	1087	13.85	1.68	13	27	45.87	18.88
18 weeks, 17+ points	218	18.67	2.82	17	33	46.15	17.98
22 weeks, 21+ points	99	23.68	3.99	21	40	43.44	18.59

Note. Data were divided into subsets based on a minimum data requirement: for six weeks, students with at least five data points were included; for 10 weeks, students with at least nine data points were included; for 14 weeks, students with at least 13 data points were included, and so on.

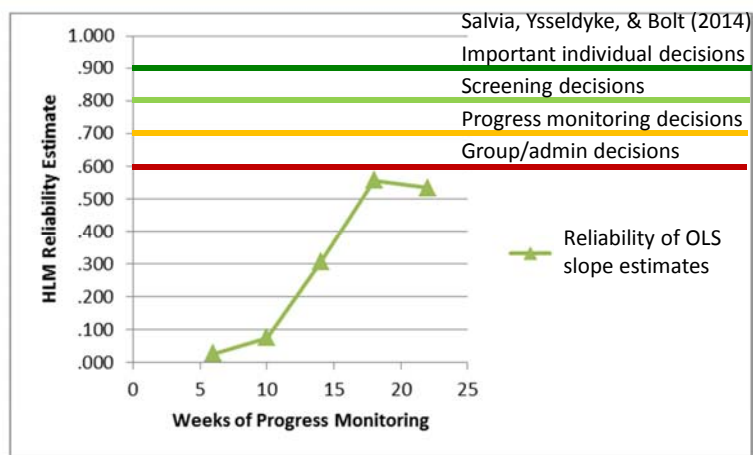
5/19/2015

©2015, Dynamic Measurement Group, Inc.

10



Study 1 Reliability of Student Slope Estimates



HLM estimates of the reliability of the individual student measure used to evaluate student progress at 6, 10, 14, 18, and 22 weeks.

5/19/2015

©2015, Dynamic Measurement Group, Inc.

11



Caution

"The conclusion across multiple studies seems apparent: CBM-R progress monitoring is not an evidence-based practice for modeling growth of individual students' gains in reading. Substantial research is necessary to guide progress monitoring implementation, if it is to be established as an evidence-based practice."

Ardoin, Christ, Morena, Cormier, & Klingbeil (2013)

At the very least, caution is warranted when considering slope of student progress.

5/19/2015

©2015, Dynamic Measurement Group, Inc.

12



An Alternative to Slope: Student Growth Percentile

Student growth percentiles provides a measure of "how (ab)normal a student's growth is by examining their current achievement relative to their academic peers -- those students beginning at the same place" (Betebenner, 2011, p. 3).

Potential advantages of student growth percentiles:

1. Progress decisions are based on the *level* of student performance at a point in time.
2. Level can be estimated with high reliability using
 - The mean of the most current 3 assessments.
3. Slope of student performance is not required and not estimated.

5/19/2015

©2015, Dynamic Measurement Group, Inc.

13



DIBELS® Pathways of Progress™ Student Growth Percentile

As implemented in DIBELS® Pathways of Progress™

1. For each unique BOY DIBELS Composite Score (DCS), the 20th, 40th, 60th, and 80th quantiles were calculated for DORF WC.
2. A stiff, spline quantile regression model was fit to each quantile using BOY DCS as the predictor.
3. The predicted quantile scores from the regression model corresponding to each unique BOY DCS formed the end-of-year pathway borders.
4. Pathway borders were linearly interpolated for each week after BOY benchmark using the BOY DORF WC at week zero and the EOY Pathways of Progress border at week 35

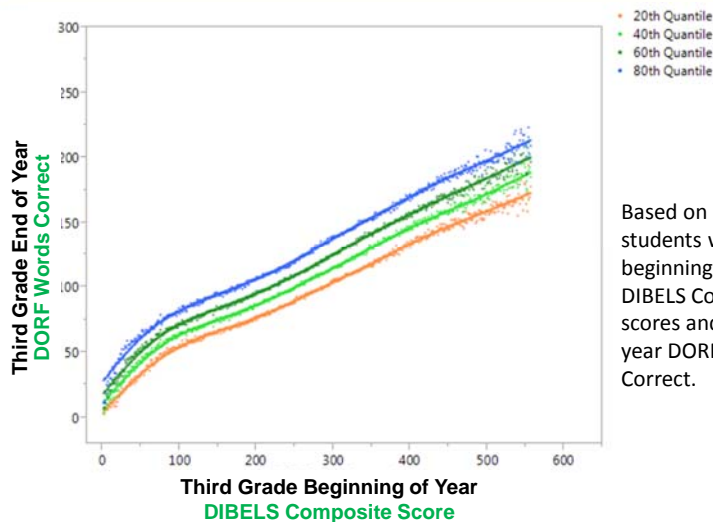
5/19/2015

©2015, Dynamic Measurement Group, Inc.

14



Student Growth Percentile Spline Quantile Regressions



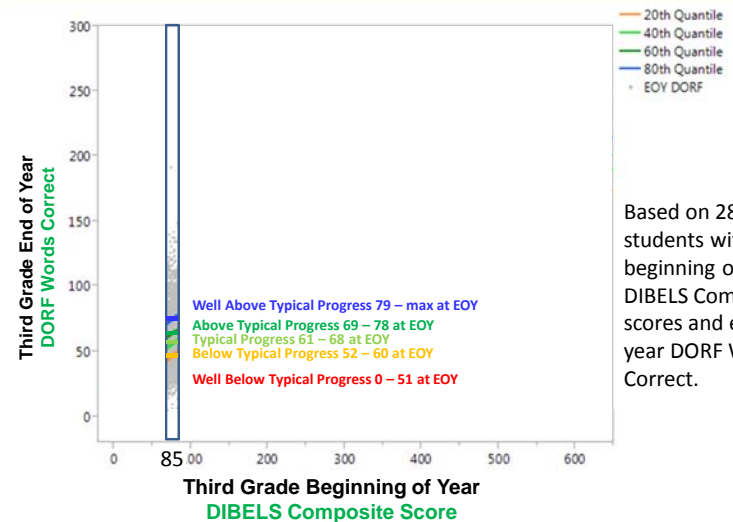
5/19/2015

©2015, Dynamic Measurement Group, Inc.

15



Pathways of Progress: Spline Quantile Regressions



5/19/2015

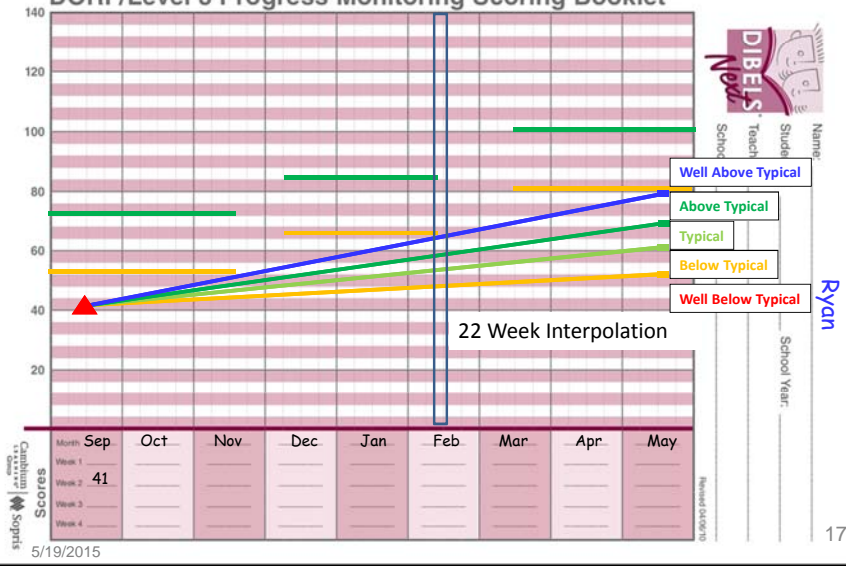
©2015, Dynamic Measurement Group, Inc.

16

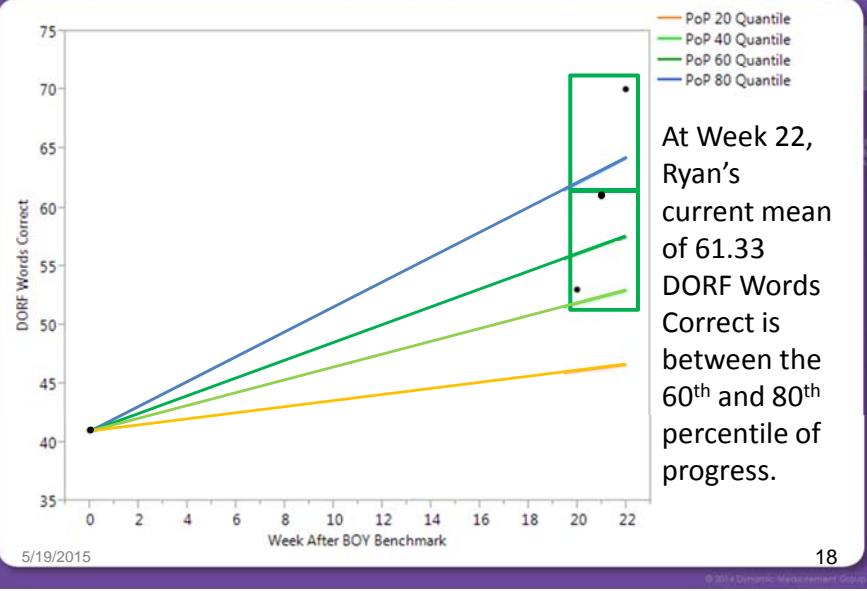
Progress Monitoring

DORF LEVEL 3

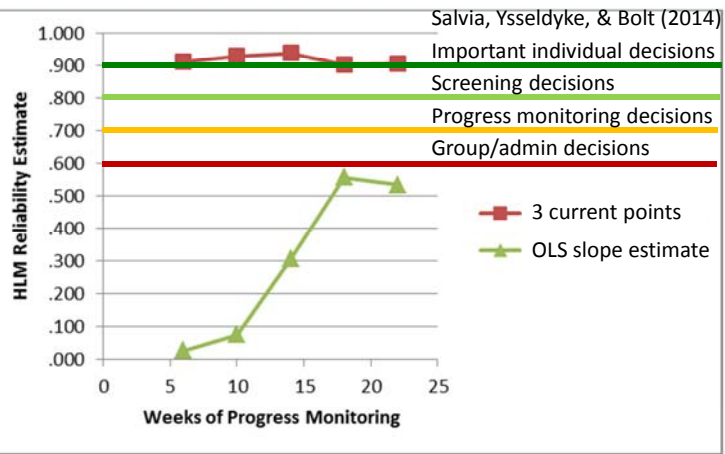
DORF/Level 3 Progress Monitoring Scoring Booklet



Ryan's Progress at Week 22 Based on Mean of 3 Current Points



Study 1: Reliability of 3 Current Points



HLM estimates of the reliability of the individual student measure used to evaluate student progress at 6, 10, 14, 18, and 22 weeks.

Study 2 Cohorts

- A K-1 Cohort was assessed at the beginning of kindergarten (BOY K), at the end of kindergarten (EOY K) and at the end of first grade (EOY 1).
- A 3-4 Cohort was assessed at the beginning of third grade (BOY 3), at the end of kindergarten (EOY 3) and at the beginning of fourth grade (BOY 4).

Cohort	Variable	N	M	SD
K-1	BOY K DIBELS Composite	35,328	34.92	25.63
K-1	EOY K DIBELS Composite	35,328	147.46	44.21
K-1	EOY 1 DIBELS Composite	35,328	192.35	85.05
3-4	BOY 3 DIBELS Composite	7,157	272.08	106.95
3-4	EOY 3 DIBELS Composite	7,157	388.35	112.02
3-4	BOY 4 DIBELS Composite	7,157	336.37	114.52

5/19/2015



Third Grade DIBELS Composite Score

Beginning of Year Benchmark

DORF Words Correct = _____ [1]

Retell Score _____ x 2 = _____ [2]

Daze Adjusted Score _____ x 4 = _____ [3]

DORF Accuracy Percent: _____ %
100 x (Words Correct / (Words Correct + Errors))

Accuracy Value from Table = _____ [4]

DIBELS Composite Score (add values 1-4) = _____

If DORF is below 40 and Retell is not administered, use 0 for the Retell value only for calculating the DIBELS Composite Score. Do not calculate the composite score if any of the values are missing.

1. Reading at an appropriate rate
2. Reading orally with understanding
3. Reading silently for meaning in context
4. With a high degree of accuracy

DIBELS® Composite Score represents **reading for meaning** at an **adequate rate** and with a **high degree of accuracy**.



Study 2: K-1 Cohort Effects of BOY Status and Pathway

Outcome: End of first grade DIBELS Composite score.

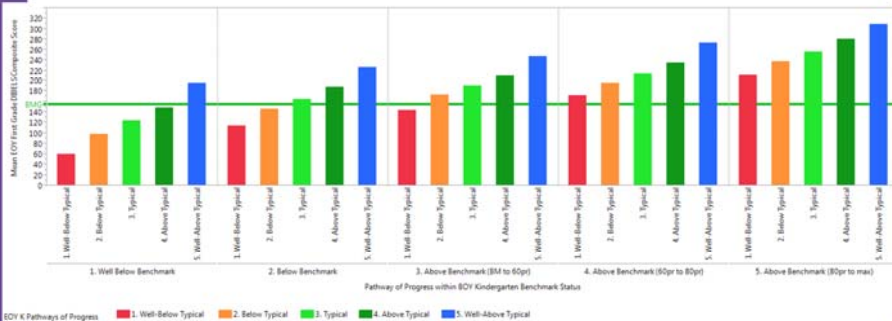
Source	F	eta squared
BOY grade K benchmark status	4,979.12*	.306
Grade K progress	3,045.00*	.187
Status * progress	12.11*	.003

*p < .001.



Study 2: K-1 Cohort Pathways within Benchmark Status

Relation of Kindergarten beginning of year benchmark status and Kindergarten pathway of progress to Grade 1 end of year DIBELS Composite Score (n = 35,328).



BOY K Pathways of Progress 1. Well-Below Typical 2. Below Typical 3. Typical 4. Above Typical 5. Well-Above Typical



Study 2: 3-4 Cohort Effects of BOY Status and Pathway

Outcome: Beginning of fourth grade DIBELS Composite score.

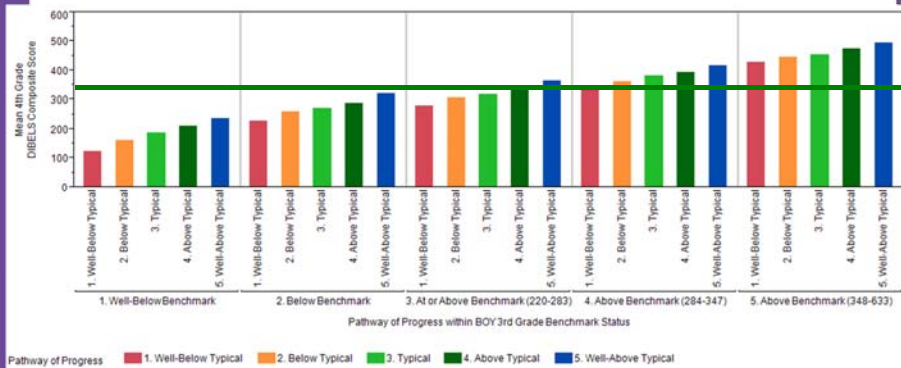
Source	F	eta squared
BOY grade 3 benchmark status	4,347.15*	.657
Grade 3 progress	368.36*	.056
Status * progress	2.31	.001

*p < .001.



Study 2: 3-4 Cohort Pathways within Benchmark Status

Relation of Grade 3 beginning of year benchmark status and Grade 3 pathway of progress to Grade 4 beginning of year DIBELS Composite (n = 7,157).



5/19/2015

© 2015, Dynamic Measurement Group, Inc.

25



Conclusions

1. The reliability of the *individual student measure* upon which progress decisions are based is much higher for Pathways of Progress than for OLS slope.
2. Progress in Kindergarten and progress in third grade are related to later reading outcomes over and above initial skills.

5/19/2015

© 2015, Dynamic Measurement Group, Inc.

26



Limitations

- We do not have information on assessment fidelity & we do not know the level of assessor training. However, these data do represent the way *DIBELS Next* is used in practice.
- Rates of progress were not experimentally manipulated. They are potentially manipulable, and their ultimate value will depend upon the impact on student outcomes.
- The week after the BOY benchmark represents a straight calendar week. We were not able to model instructional weeks accounting for school holidays or breaks.

5/19/2015

© 2015, Dynamic Measurement Group, Inc.

27



Where Can I Get More Information?

DMG website: www.dibels.org

The screenshot shows the DMG website homepage with sections for Assessments, Resources, Pathways of Progress, and DIBELS AD. A prominent banner for the 'DIBELS SUPER INSTITUTE' is visible, along with news items and training opportunities.

5/19/2015

© 2015, Dynamic Measurement Group, Inc.

28



References

Ardoin, S. P., Christ, T. J., Morena, L. S., Cormier, D. C., & Klingbeil, D. A. (2013). A systematic review and summarization of the recommendations and research surrounding curriculum-based measurement of oral reading fluency (CBM-R) decision rules. *Journal of School Psychology, 51*, 1–18. <http://dx.doi.org/10.1016/j.jsp.2012.09.004>.

Betebenner, D. W. (2011). *An overview of student growth percentiles*. National Center for the Improvement of Educational Assessment. (retrieved 2014-06-10). http://www.state.nj.us/education/njsmart/performance/SGP_Detailed_General_Overview.pdf

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. New York, NY: Routledge.

Salvia, J., Ysseldyke, J. E., & Bolt, S. (2014). *Assessment in Special and Inclusive Education* (12th ed.). Belmont, CA: Wadsworth.