Predictive Validity of Pathways of Progress™ Decisions for RTI

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Agenda

• Rationale for & importance of progress monitoring for RTI
• Desirable qualities of progress monitoring
• Student Progress Percentiles: Pathways of Progress™
• Research Questions
• Procedures
• Results
• Discussion & Questions

NASP Practice Model

Essential Elements of RTI

Although there is no specific definition of RTI, essential elements can be found when we take a look at how states, schools, and districts fit RTI into their work. In general, RTI includes:

➤ screening children within the general curriculum,
➤ tiered instruction of increasing intensity,
➤ evidence-based instruction,
➤ close monitoring of student progress, and
➤ informed decision making regarding next steps for individual students.

http://www.parentcenterhub.org/repository/rti/#elements
Accessed: 1/22/2015
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

John Hattie (2009) evaluated more than 800 meta-analyses of 138 influences on student achievement:
- Student
- Teacher
- Teaching
- Curricula
- School
- Home

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.

DIBELS®, and the Outcomes Driven Model were developed from the ground up to inform Response to Intervention Decisions with frequent progress monitoring toward meaningful goals.

From the very first DIBELS research proposal:

“...Research is needed on curriculum-based measurement procedures that are valid and reliable for monitoring progress, evaluating the effectiveness of instruction, and identifying kindergarten and first grade students who are at-risk for academic problems.” (Kaminski & Good, 1988)
Elements of Defensible Progress Monitoring...

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

Purpose of Pathways of Progress™

- Assist in setting **ambitious, meaningful, attainable** student learning goals and evaluating progress.
- Provide a normative reference to consider when setting goals and evaluating progress.
- Clarify what rate of progress is typical, above typical, well above typical, as well as below typical or well-below typical.

Pathways of Progress™ based on 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).

- Compared to other students with the same beginning of year DIBELS Composite Score of 178, at the middle of the year Robert’s progress to 222 was between the 20th percentile and 40th percentile.
- Using Pathways of Progress, an individual student progress decision for Robert would be: **Below typical progress**

Pathways Graphs: Robert

Additional information about Pathways of Progress is available at http://dibels.org
### Reliability of Slope Metric and Level of Performance Based on the Last 3 Data Points

- Initial analysis of students who had at least 14 assessments over widely varying lengths of time.

<table>
<thead>
<tr>
<th>Grade</th>
<th>OLS Slope of Progress</th>
<th>Moving Mean Pathways of Progress™</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( N )</td>
<td>( M )</td>
</tr>
<tr>
<td>First</td>
<td>356</td>
<td>1.09</td>
</tr>
<tr>
<td>Second</td>
<td>2051</td>
<td>1.16</td>
</tr>
<tr>
<td>Third</td>
<td>843</td>
<td>0.61</td>
</tr>
<tr>
<td>Fourth</td>
<td>1010</td>
<td>0.55</td>
</tr>
<tr>
<td>Fifth</td>
<td>610</td>
<td>0.45</td>
</tr>
</tbody>
</table>
What we know...
Reliability of 3 Current Points for Pathways

Salvia, Ysseldyke, & Bolt (2014)

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

Good Progress Monitoring Decisions

Good progress monitoring decisions are ones that enable educators to improve outcomes for students.

1. Good decisions about progress provide **timely** information to inform instruction.
2. Good decisions about progress are reasonably **stable** and reliable.
3. Good decisions about progress provide **instructionally relevant** information for individual students.
4. Good decisions about progress provide instructionally relevant information at a **systems level** to inform classroom instruction.

Pathways of Progress™
Does it Matter?

- We know that the level of skills for a student at the beginning of the year is an important predictor of their later reading outcomes.
- One way to examine the importance of Pathways of Progress is to consider the contribution of Pathways to initial skills in predicting later outcomes over and above their initial skills.
- Beginning of kindergarten skills strongly predicts beginning of first grade skills.
- Do Pathways of Progress in kindergarten add to that prediction?
- What about third to fourth grade?

Purpose and Research Questions

The purpose of this study is to evaluate the predictive validity of Pathways of Progress for predicting future reading outcomes.

Research questions include:

1. For grades K - 5, what is the probability associated with different levels of progress (DIBELS Pathways of Progress) in achieving future outcomes given the level of initial skills (beginning of year DCS) for students right at the benchmark?
2. For grades K - 5, what is the probability associated with different levels of progress (DIBELS Pathways of Progress) in achieving future outcomes given the level of initial skills (beginning of year DCS) for students right at the cut point for risk?
3. What is the amount of additional variance accounted for by Pathways of Progress when predicting student outcomes in subsequent grades?
Methodology: Participants

Participants included students in DIBELSnet data systems who had complete DIBELS Next data for beginning- and end-of-year grade level assessments and beginning of year assessment for the next grade.

- Grade K – 1 Cohort: 36,022 students
- Grade 1 – 2 Cohort: 29,846 students
- Grade 2 – 3 Cohort: 25,266 students
- Grade 3 – 4 Cohort: 21,341 students
- Grade 4 – 5 Cohort: 20,185 students
- Grade 5 – 6 Cohort: 10,254 students

Methodology: Procedures/Analysis

- Student progress was assessed through logistic regression models.
- We evaluated the difference in the probability of meeting the next grade-level benchmark goals between each Pathway.
- A series of multiple logistic regression models at each grade level were used to examine proportion of variance in the outcome (next grade skills) explained by BOY initial skills and end of year Pathway of Progress.
- The additional variance explained by Pathways beyond initial skill was examined.

Results: Overview

- Logistic Regression Results (Figures 1 – 7)
- Summary data for Pathways 1, 3, & 5 (Tables 1 & 2)
- Amount of variance accounted for in the full model, and additional variance accounted for by Pathway (Table 3)

Grade K Predicting Beginning-Of-Year Grade 1

Well above typical progress
Above typical progress
Typical progress
Below typical progress
Well below typical progress

N = 36,022
R² = .4865
Grade K Predicting End-Of-Year Grade 1

R^2 = .3928
N = 36,022

Beginning of Kindergarten DIBELS Composite Score

Grade 1 Predicting Beginning-Of-Year Grade 2

R^2 = .6804
N = 29,846

Beginning of First Grade DIBELS Composite Score

Grade 2 Predicting Beginning-Of-Year Grade 3

R^2 = .6796
N = 25,266

Beginning of Second Grade DIBELS Composite Score

Grade 3 Predicting Beginning-Of-Year Grade 4

R^2 = .7291
N = 21,341

Beginning of Third Grade DIBELS Composite Score
Table 1 Right at the Benchmark Goal

Likelihood of Being At or Above Benchmark at Subsequent Grade Given **Right at the Benchmark Goal** at Beginning of Current Grade

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Outcome</th>
<th>Well below typical progress</th>
<th>Typical progress</th>
<th>Well above typical progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade K BOY</td>
<td>Grade 1 BOY</td>
<td>17%</td>
<td>57%</td>
<td>92%</td>
</tr>
<tr>
<td>Grade K BOY</td>
<td>Grade 1 EOY</td>
<td>35%</td>
<td>66%</td>
<td>91%</td>
</tr>
<tr>
<td>Grade 1 BOY</td>
<td>Grade 2 BOY</td>
<td>18%</td>
<td>88%</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>Grade 2 BOY</td>
<td>Grade 3 BOY</td>
<td>16%</td>
<td>48%</td>
<td>82%</td>
</tr>
<tr>
<td>Grade 3 BOY</td>
<td>Grade 4 BOY</td>
<td>18%</td>
<td>50%</td>
<td>81%</td>
</tr>
<tr>
<td>Grade 4 BOY</td>
<td>Grade 5 BOY</td>
<td>18%</td>
<td>46%</td>
<td>75%</td>
</tr>
<tr>
<td>Grade 5 BOY</td>
<td>Grade 6 BOY</td>
<td>88%</td>
<td>97%</td>
<td>99%</td>
</tr>
</tbody>
</table>

Table 2 Right At the Cut Point for Risk

Likelihood of Being At or Above Benchmark at Subsequent Grade Given **Right at the Cut Point for Risk** at Beginning of Current Grade

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Outcome</th>
<th>Well below typical progress</th>
<th>Typical progress</th>
<th>Well above typical progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade K BOY</td>
<td>Grade 1 BOY</td>
<td>8%</td>
<td>39%</td>
<td>85%</td>
</tr>
<tr>
<td>Grade K BOY</td>
<td>Grade 1 EOY</td>
<td>21%</td>
<td>46%</td>
<td>82%</td>
</tr>
<tr>
<td>Grade 1 BOY</td>
<td>Grade 2 BOY</td>
<td>7%</td>
<td>68%</td>
<td>98%</td>
</tr>
<tr>
<td>Grade 2 BOY</td>
<td>Grade 3 BOY</td>
<td>5%</td>
<td>19%</td>
<td>61%</td>
</tr>
<tr>
<td>Grade 3 BOY</td>
<td>Grade 4 BOY</td>
<td>5%</td>
<td>19%</td>
<td>57%</td>
</tr>
<tr>
<td>Grade 4 BOY</td>
<td>Grade 5 BOY</td>
<td>5%</td>
<td>17%</td>
<td>48%</td>
</tr>
<tr>
<td>Grade 5 BOY</td>
<td>Grade 6 BOY</td>
<td>24%</td>
<td>58%</td>
<td>83%</td>
</tr>
</tbody>
</table>
Table 3. Additional Variance Explained in Reading Outcomes by Pathways of Progress

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Outcome</th>
<th>Total Model R²</th>
<th>Additional Variance Explained by Pathway¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade K BOY</td>
<td>Grade 1 BOY</td>
<td>49%</td>
<td>25%</td>
</tr>
<tr>
<td>Grade K BOY</td>
<td>Grade 1 EOY</td>
<td>39%</td>
<td>15%</td>
</tr>
<tr>
<td>Grade 1 BOY</td>
<td>Grade 2 BOY</td>
<td>68%</td>
<td>35%</td>
</tr>
<tr>
<td>Grade 2 BOY</td>
<td>Grade 3 BOY</td>
<td>69%</td>
<td>7%</td>
</tr>
<tr>
<td>Grade 3 BOY</td>
<td>Grade 4 BOY</td>
<td>73%</td>
<td>5%</td>
</tr>
<tr>
<td>Grade 4 BOY</td>
<td>Grade 5 BOY</td>
<td>72%</td>
<td>5%</td>
</tr>
<tr>
<td>Grade 5 BOY</td>
<td>Grade 6 BOY</td>
<td>69%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Note: Model R² is the Nagelkerke R².

¹All pathways contributions are significant, \( p < .001 \).

Analysis of Pathways of Progress Effect on Mean Future Reading Skills

- What about average performance on future reading assessments?
- We looked more closely at the K-1 Cohort and the 3-4 Cohort to examine Pathways of Progress differences in mean DIBELS Composite Scores given the student’s broad level of initial reading skills.
  - Well below benchmark
  - Below benchmark
  - Just at benchmark (benchmark goal to 59th percentile)
  - Above benchmark (60th percentile to 79th percentile)
  - Well above benchmark (80th percentile and above)
Conclusions

1. The probability of achievement benchmark on the DCS in the subsequent grade is progressively higher across the ordinal Pathways.
   - For example, probability is greater for Pathway 4 than for Pathway 3

2. The Pathway that a student is on shares a significant amount of variability with the outcome.
   - For example, when the Pathway changes, the outcome changes in the same direction.

*The Pathway matters!*

Limitations

- These data represent the way DIBELS Next is used in practice.
- Things we do not know:
  - Assessment fidelity
  - Assessor training
  - Level of instructional support
  - Changes in levels of support

Implications For Practice

- **Know Where Students Start**
  - A student who begins the year at the cut-point and does not make progress is unlikely to achieve subsequent grade level outcomes without additional support.
- **Set Ambitious Goals**
  - Use the DIBELSnet goal setting utility to determine and select goals that reflect Typical, Above Typical, or Well Above Typical progress.
- **Monitor/Evaluate Student Progress**
  - Examining the data on their progress monitoring graph, including the Pathway.
  - Examine middle- and end-of-year classroom Pathways Reports

Case Studies

Robert & Donna
Pathways of Progress in an Outcomes-Driven Model

Outcomes Driven Model Steps:
1. Identify need for support.
2. Validate need for support.
3. Plan and implement support.
4. Evaluate and modify support.
5. Review outcomes.

The purpose of Pathways of Progress™ is to assist in setting goals and evaluating progress.

Three Guiding Principles in Establishing Individual Student Learning Goals

• Meaningful:
  - Goals should support students to achieve meaningful outcomes or increase the likelihood of achieving meaningful and important outcomes.

• Ambitious:
  - Above typical or well above typical progress are ambitious goals.
  - Typical progress may be sufficient for students who are at or above benchmark.
  - Typical progress may not be adequate for students who are likely to need additional support to achieve benchmark goals.
  - Below typical or well below typical progress are just not very ambitious.

• Attainable:
  - High in the well above typical range is probably not attainable.
  - Typical and above typical progress is readily attainable.
  - Well below typical and below typical progress may be attainable, but are not ambitious or meaningful.

Third Grade At Cut Point for Risk Student Case Example: Robert

Robert’s Skills at Beginning of Year in Third Grade
- 178 DIBELS Composite Score
- 60 DORF Words Correct
- 94% DORF Accuracy
- 9 DORF Retell
- 7 Daze Adjusted Score

Establish a goal that is meaningful: proficient reading at or above benchmark or reduce risk
attainable: typical or above typical progress is attainable
ambitious: Because Robert is below Benchmark at BOY, above typical progress or greater is appropriate

Third Grade At Benchmark Student Case Example: Donna

Donna’s Initial Skills at Beginning of Year in Third Grade
- 222 DIBELS Composite Score
- 68 DORF Words Correct
- 96% DORF Accuracy
- 17 DORF Retell
- 8 Daze Adjusted Score

Establish a goal that is meaningful: proficient reading at or above benchmark or reduce risk
attainable: typical or above typical progress is attainable
ambitious: Because Donna is below Benchmark at BOY, above typical progress or greater is appropriate
Meaningful Goals Improve Outcomes
Grade 3 Predicting Beginning-Of-Year Grade 4

Robert

Well above typical progress
Above typical progress
Typical progress
Below typical progress
Well below typical progress

N = 21,341
R² = .7291

Beginning of Third Grade DIBELS Composite Score

Robert's Skills at Beginning of Year in Third Grade
- 178 DIBELS Composite Score
- 60 DORF Words Correct
- 94% DORF Accuracy
- 9 DORF Retell
- 7 Daze Adjusted Score

Robert's End of Year Goal:
By the end of the year, Robert will read grade-level text orally at a rate of 102 or more words correct per minute, with at least 98% accuracy, and be able to talk about what he has read with at least 40 words about the passage. He will read grade-level text silently for meaning with at least 21 Daze adjusted score.
At the middle of year checkup, Robert is well below benchmark and is making below typical progress overall as indicated by his DIBELS Composite Score. At this time he is not making adequate progress to be on track in 4th grade.

- His strength is in word reading accuracy where his progress is typical and he is at or above benchmark.
- His progress on Daze Adjusted Score was typical, but he is still below benchmark.
- He has notable difficulty talking about what he has read, with well below benchmark skills on DORF Retell and well below typical progress.

Overall, Robert is making below typical progress at the middle of the year, and typical progress by the end of the year.
Meaningful Goals Improve Outcomes
Grade 3 Predicting Beginning-Of-Year Grade 4

On DORF Words Correct, Robert is also making below typical progress at the middle of the year, and typical progress by the end of the year, with 96% accuracy.

On DORF Retell, Robert is making well below typical progress at the middle of the year, and below typical progress by the end of the year. His retell quality was consistently rated as a 1, the lowest level.

On Daze Adjusted Score, Robert was below benchmark in the middle of the year, and making typical progress (barely). By the end of the year he had made well above typical progress and was above benchmark.
Donna's Initial Skills at Beginning of Year in Third Grade

- **222 DIBELS Composite Score**
- **68 DORF Words Correct**
- **96% DORF Accuracy**
- **17 DORF Retell**
- **8 Daze Adjusted Score**

Donna's End of Year Goal:

By the end of the year, Donna will read grade-level text orally at a rate of 107 or more words correct per minute, with at least 98% accuracy, and be able to talk about what she has read with at least 46 words about the passage. She will read grade-level text silently for meaning with at least 21 Daze adjusted score.

- Donna is making above typical progress or well above typical progress in all areas.
- Making adequate progress in all areas.
Meaningful Goals Improve Outcomes
Grade 3 Predicting Beginning-Of-Year Grade 4

Implications For Future Research

- This study provides one of the very few examinations of the impact of benchmark level performance in one grade on benchmark performance in the subsequent grade.
- This study is the only examination that we know of that uses the DIBELS Next Composite Score with a very large sample (N ≈ 1.8 million students) and accounts for progress across the year.
- Future research should replicate these results.

Pathways of Progress™
Conclusions and Big Ideas

- Pathways of Progress clarifies what rate of progress is typical, above typical, or well above typical. Pathways of progress also informs educators when progress is below typical or well-below typical.
- Pathways of Progress inform meaningful, ambitious, and attainable goals taking into account the student’s level of initial skills.
- Pathways of Progress provides a way to separate estimates of initial skills from decisions about progress.
- Pathways of Progress provide a highly reliable basis for evaluating progress.
- Pathways of Progress are valid & important predictors of future student outcomes.

References/Resources for Further Reading


