

DIBELS Pathways of Progress: Setting Ambitious, Meaningful, and Attainable Goals in Grade Level Material

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Introduction

Currently, educators have a variety of means to set academic goals. The three most typical ways to set goals are by using: (1) data from previous research on the amount of progress expected for students in various grades (i.e., number of words correct gain per week); (2) data on local or national percentiles; or (3) data from empirically-based benchmarks. All of these methods offer valuable guidance for setting goals, in particular in the context of monitoring the progress of students receiving additional instructional support. However, a concern with each of these methods is that they don't take into account different measurement materials used, different times of year, and different levels of student's initial skills.

In this poster, we present student progress percentiles as a proposed method to assist and inform educators in setting meaningful, ambitious, and attainable goals. We will illustrate the development and use of student progress percentiles using third grade as an exemplar. The student progress percentiles are based on a normative sample of 8,900 third-grade students in 56 districts and 150 schools.

DIBELS® Pathways of Progress™ are based on student progress percentiles. They are designed to be used with *DIBELS Next*® to assist educators in: (a) setting an ambitious, meaningful, attainable goal and an aim line for individual, grade-level progress monitoring; and (b) evaluating rates of progress for individual students. Pathways of Progress are based on student rates of reading progress relative to other students with similar initial skills. This information provides a normative reference for professionals to consider when establishing a goal and aim line for an individual student. Pathways of Progress are intended to be one of several frames of reference that should be considered when establishing a goal.

Considerations in Making Progress and Establishing Individual Student Goals

Considerations for the Rates of Progress for Establishing Individual Student Goals
<i>Rate of progress necessary to</i> • Achieve important benchmark goals. • Increase odds of achieving subsequent goals. • Narrow the achievement gap with students making adequate progress.
<i>Rate of progress that is</i> • Possible with a very effective, research-based intervention. • Typical or expected relative to other students with similar initial skills.
Statistical Considerations
Nonlinearity of the relationship between the composite score and the outcome measure.
Homoscedasticity between groups of students separated by their beginning-of-year scores.
Change in variance from the lower-end to the upper-end of the scoring range of the composite score.

Goal Setting Logic and Methodology

By observing a student's current skills and later benchmark goals, we are able to set *meaningful* goals for the student that will either achieve or increase the odds of achieving subsequent goals.

Pathways of Progress emphasizes the end point of the pathway and provides a normative framework for comparison in setting goals and evaluating individual student progress. Student progress is evaluated relative to the student's peers, that is, growth is **compared to students with similar initial skills at the same grade level on the same material**. Progress that is typical or above typical is considered attainable progress. Progress that is above typical or well-above typical can be considered ambitious progress.

Statistical Considerations and Analysis

First, we created a prediction expression that modeled student outcomes across the school year given the student's beginning-of-year skills. Second, we modeled the variability of actual outcomes around the predicted outcome for each level of initial skills. Third, we divided the actual outcomes relative to predicted outcomes into five categories that we labeled *well-below typical progress* to *well-above typical progress*.

With one prediction expression, we created four outcome levels, and each outcome level represents the end-point of a pathway of progress border (well-below to well-above typical progress). The expression follows this format:

[Prediction Equation] + [Z-Score] x [Variance Component]	
Prediction Equation	The prediction of the mean based on a model predicting the EOY individual <i>DIBELS</i> measure from the BOY Composite Score.
Z-Score	The 20th, 40th, 60th, or 80th quantile from the standard normal distribution. These quantiles represent the borders for the pathways.
Variance Component	The prediction for the variance based on a separate model predicting the standard deviation from the mean BOY composite score. In cases where the assumption of homoscedasticity is not violated, we used the Root Mean Squared Error (RMSE) as the Variance Component.

Within the borders, we define the rates of progress as follows:

Quantile Range	Definition of Rate of Progress
Above 79%	Well Above Typical Progress
60%–79%	Above Typical Progress
40%–59%	Typical Progress
20%–39%	Below Typical Progress
Below 20%	Well-Below Typical Progress

Models were fit individually for each grade and time of year. Model fit was evaluated in myriad ways: residual plots, fit statistics, and variability charts. Care was taken not to over-fit to the sample, i.e., the predictability of the model is not localized to this sample. Whenever possible, the simpler model was chosen.

An Illustrated Example

To illustrate the concept of Pathways of Progress, we present an example from third grade ($N \approx 8,900$) focusing on the *DIBELS Next* Composite Score (DCS) and examining *DIBELS Next* Oral Reading Fluency Words Correct (DORF Words Correct). Data on approximately 166,000 students in kindergarten through sixth grade from 502 schools within 164 school districts from across the United States was exported from users who entered their data into Dynamic Measurement Group's data system, *DIBELSnet*. The sample was approximately 60% white, 23% Hispanic, and 7% Black with a free-reduced lunch rate of 35%. From this larger sample, we selected all third grade students with reported scores for beginning- and end-of-year composite score. Our third-grade sample size was approximately 8,900.

Figure 1. Pathways of Progress for third-grade end-of-year DIBELS Composite Score.

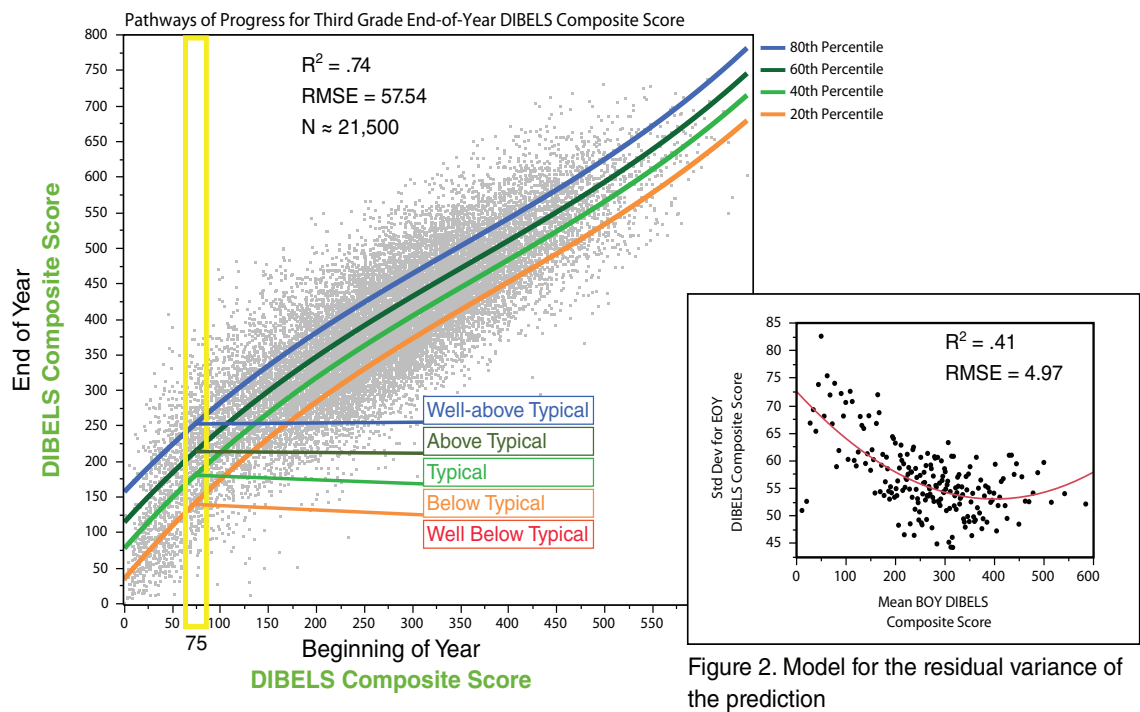


Figure 2. Model for the residual variance of the prediction

Pathways of Progress for EOY Outcomes					
<i>DIBELS Next</i> Composite and Components	Well Above Typical Progress	Above Typical Progress	Typical Progress	Below Typical Progress	Well Below Typical Progress
<i>DIBELS</i> Composite Score	272 and above	271 to 231	230 to 191	190 to 143	142 and below

In third grade, the best fit for the end-of-year DCS was a cubic regression with a quadratic variance component (see Figure 1). The residual variance of the prediction indicated heteroscedasticity, i.e., the variance was not stable across groups (see Figure 2). Instead of using the RMSE of the prediction to define our borders, we used the model for the variance. In Figure 1, Pathways of Progress end-of-year DCS outcomes are illustrated for a beginning-of-year composite score of 75.

Figure 3. Pathways of Progress for third-grade end-of-year DIBELS Oral Reading Fluency.

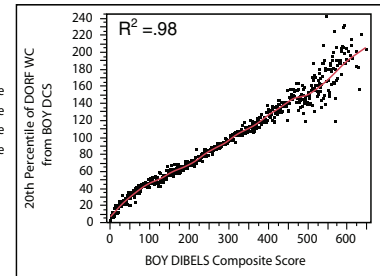
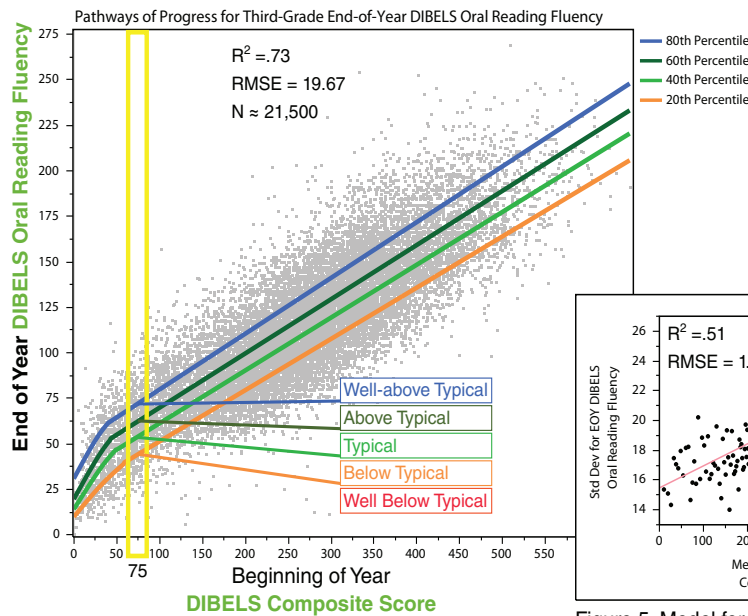


Figure 4. Spline regression was used to model the BOY DCS Scores below 40.

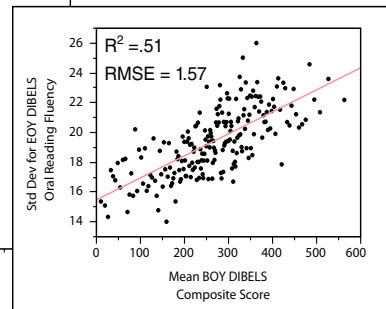


Figure 5. Model for the residual variance of the DORF prediction.

Pathways of Progress for EOY Outcomes					
<i>DIBELS Next</i> Composite and Components	Well Above Typical Progress	Above Typical Progress	Typical Progress	Below Typical Progress	Well Below Typical Progress
<i>DIBELS</i> Composite Score	272 and above	271 to 231	230 to 191	190 to 143	142 and below
DORF Words Correct	72 and above	71 to 62	61 to 54	53 to 44	43 and below

For third-grade DORF Words Correct, analysis of the data suggested that a model for the entire score range would be a poor fit at the lower-end of the scoring range. After a thorough investigation of multiple ways to model the data, the best fit proved to be a piece-wise regression with a linear variance component (see Figure 3).

For the first piece, we fit a simple linear regression predicting to the raw scores of end-of-year DORF Words Correct. For the second piece, we fit a stiff spline regression to the quantiles of end-of-year DORF Words Correct (see Figure 4). Overlaying the two regressions on top of the data revealed a natural cut-point for the piece-wise fit, which was approximately 40. Thus, for BOY DCS scores greater than 40, the simple linear regression modeled the data well. For scores less than 40, the stiff spline regression modeled the quantiles well. While we feel that this fit is the best solution, the prediction is less precise at the extreme lower-end of the DCS scoring range. In addition, for instructional purposes when DCS scores are below 40 we recommend *DIBELS Next Survey* to consider of out-of-grade-level progress monitoring, and *DIBELS Deep* to identify areas of instructional need.

The residual variance of the prediction indicated increasing variance across groups. Again, instead of using the RMSE of the prediction to define our borders, we modeled the variance with a simple linear regression (see Figure 5). In Figure 3, Pathways of Progress end-of-year DORF outcomes are illustrated for a beginning-of-year composite score of 75.

Similar analyses were conducted at all grade levels and for all *DIBELS Next* component measures.

Case Studies

Along with *DIBELS Next Benchmark Goals*, Pathways of Progress is a powerful tool to enable teachers and administrators to set short and long-term goals for their students. The recommended goals for each case study shown were designed to be:

- **Meaningful:** At or above benchmark or *reduce risk*
- **Attainable:** Typical or above typical progress is attainable
- **Ambitious:** Based on BOY skills, progress is appropriately ambitious.

DIBELS Next measures, on which Pathways of Progress are based, are powerful, reliable, and valid indicators of student's reading proficiency. They are also brief and efficient. **The goal is always to make good decisions.** The end-of-year goals will be a professional judgment informed by the end-of-year benchmark goals and the Pathways of Progress. We present four, unique case studies to illustrate how the Pathways of Progress can be used to set individual goals and to evaluate individual student progress.

Penelope, Strategic Support Case Study

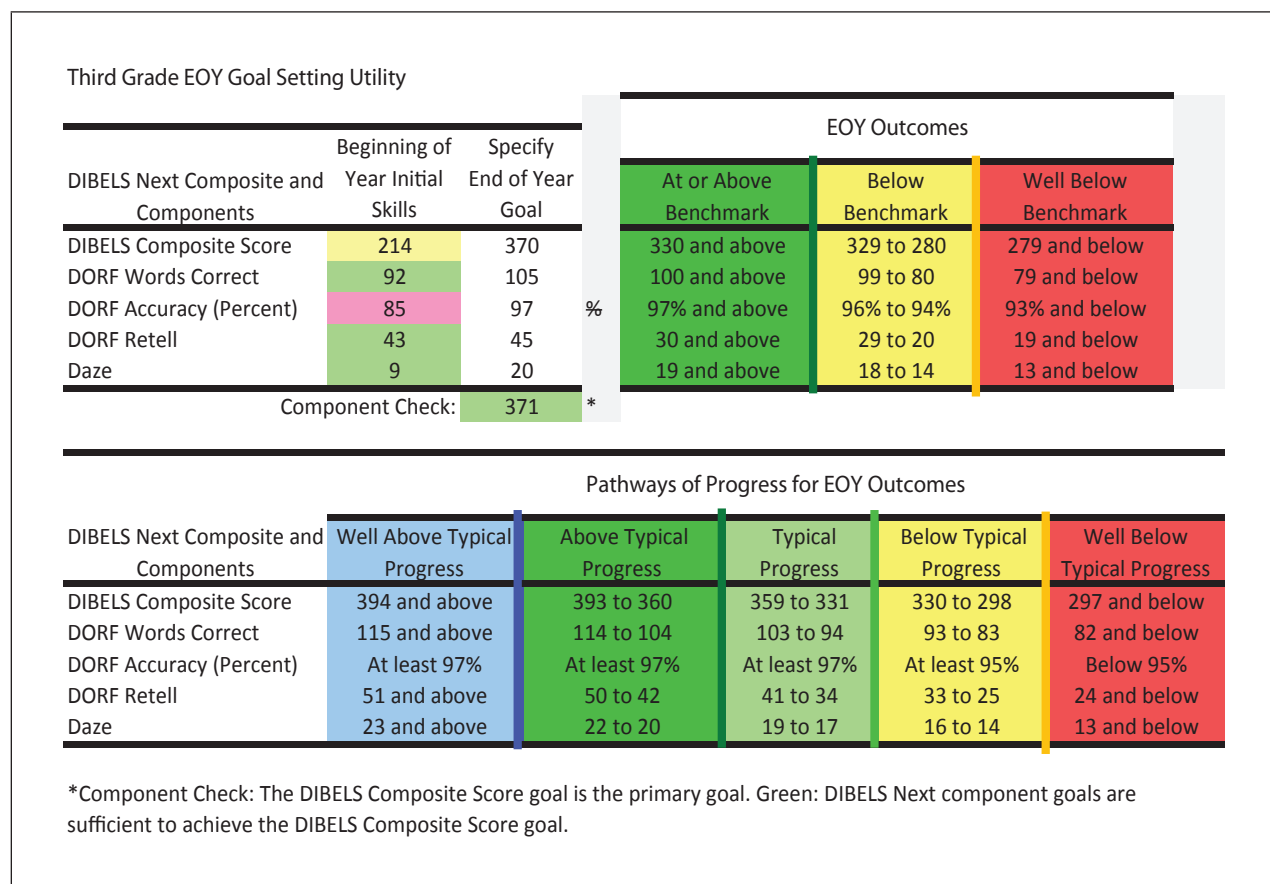


Figure 6: Penelope's Beginning-of-year DIBELS scores and end-of-year Pathway of Progress goals.

Penelope began the year below the benchmark on the *DIBELS* Composite Score, and is likely to need strategic support. Penelope's fluency score is adequate for her grade level, but she lacks accuracy in decoding.

An appropriate EOY goal for Penelope would be...

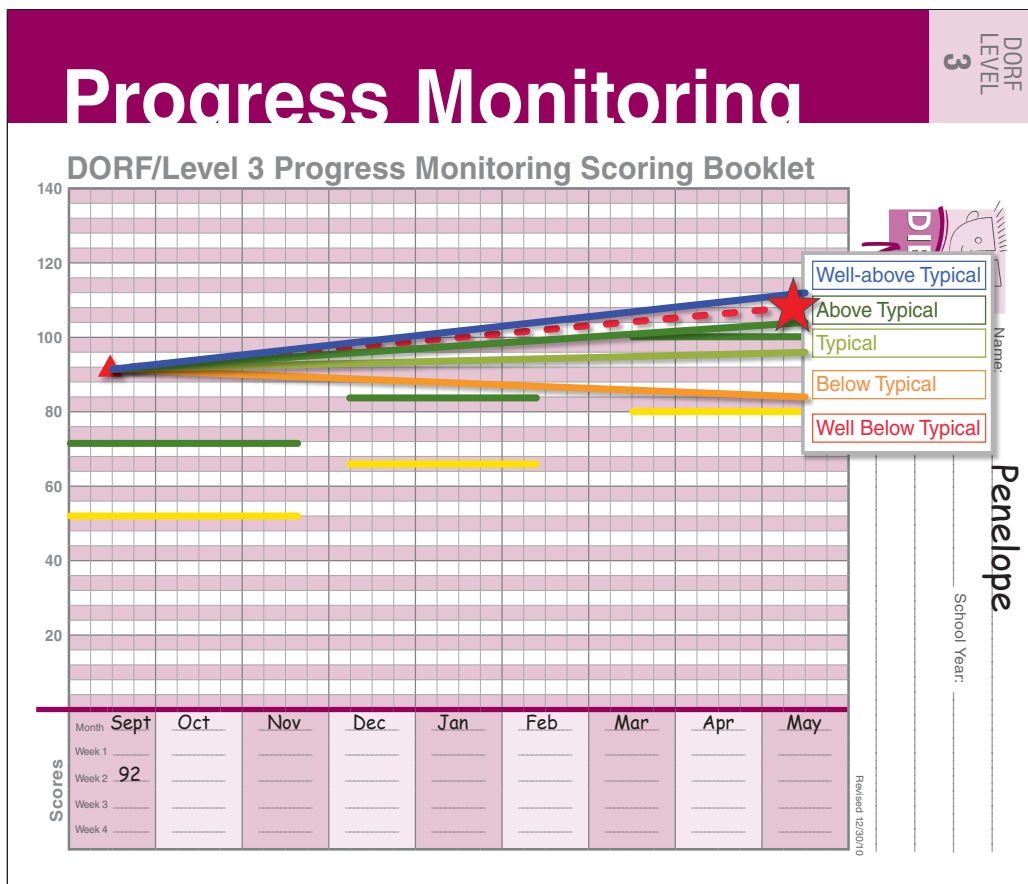
Penelope will read grade-level text orally

- at a rate of 105 or more words correct per minute (*above-typical progress*),
- with at least 97% accuracy (at least *typical progress*),
- be able to talk about what she has read with at least 45 words relevant to the passage (*above-typical progress*),
- She will read grade-level text silently, using context for meaning, with a Daze adjusted score of 20 words correct (*above typical progress*).

Penelope's Goal is...

- Meaningful: This goal achieves the benchmark and increases the odds of meeting future goals.
- Attainable: Penelope is making typical or above typical progress.
- Ambitious: In areas where Penelope is currently below benchmark, above-typical progress is appropriate.

If Penelope achieves this goal, she will be at or above benchmark on all measures by the end of year, and reading at an adequate rate with a high degree of accuracy for meaning.



Penelope's DORF Words Correct aimline is relatively flat; she needs to dramatically increase her accuracy while maintaining an adequate rate of reading.

Tabitha, Strategic Support Case Study

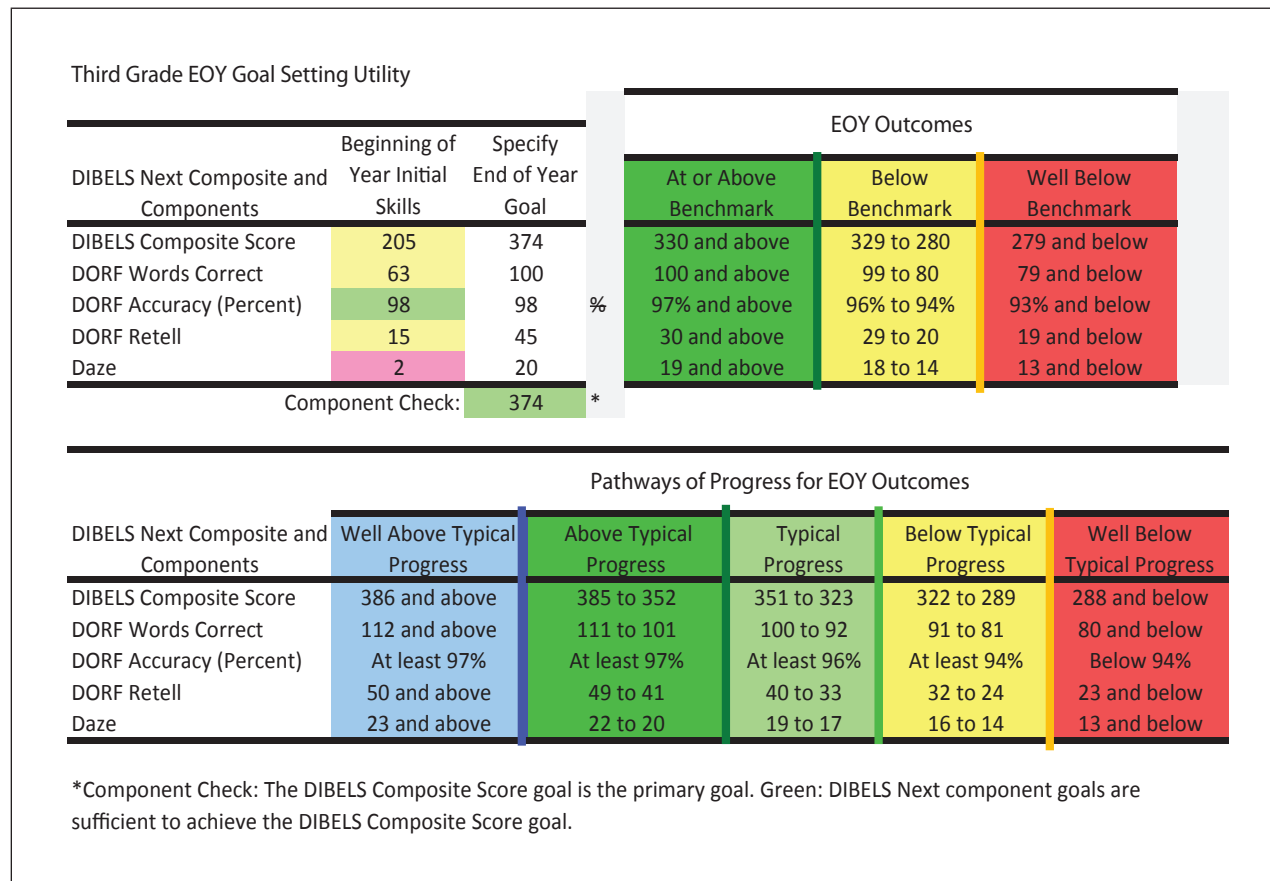


Figure 6a: Tabitha's Beginning-of-year DIBELS scores and end-of-year Pathway of Progress goals.

Tabitha also began the school year below benchmark on the **DIBELS** Composite Score, and is likely to need strategic support. An evaluation of her scores reveal that she has a different set of academic concerns than Penelope; her reading accuracy is good, but her fluency and comprehension are below benchmark.

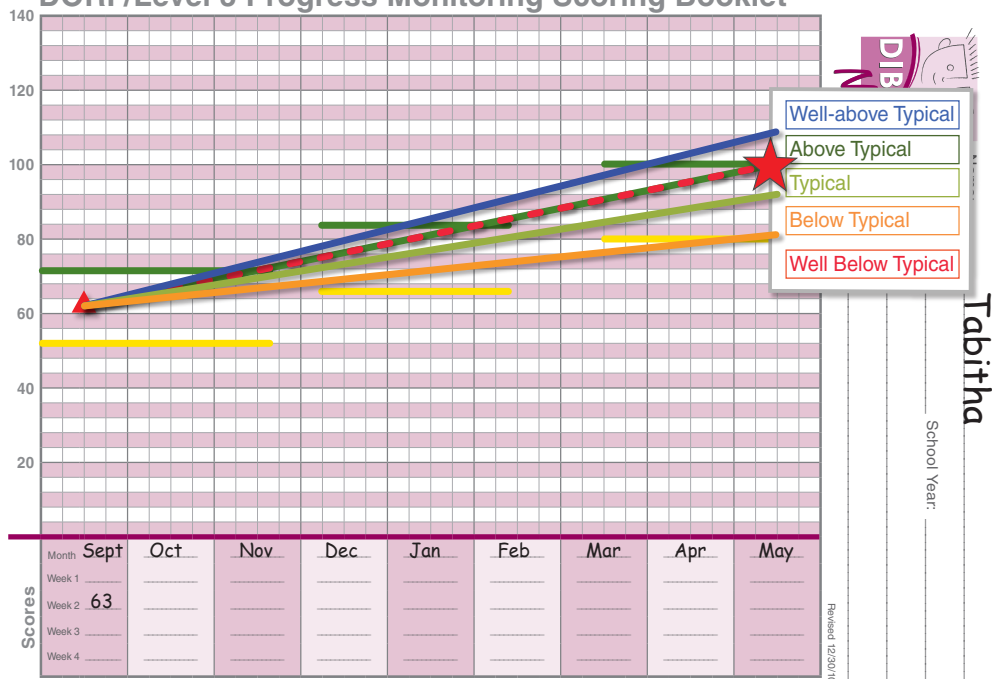
Tabitha's goal is similar to Penelope's goal because their initial skills were similar, but Tabitha has different instructional needs, which are reflected in each component skill's pathway.

An appropriate EOY goal for Tabitha would be...	Tabitha's Goal is...
<i>Tabitha will read grade-level text orally</i> - at a rate of 100 or more words correct per minute (<i>above-typical progress</i>), - with at least 98% accuracy (at least <i>typical progress</i>), - be able to talk about what she has read with at least 45 words relevant to the passage (<i>above-typical progress</i>), - She will read grade-level text silently, using context for meaning, with a Daze adjusted score of 20 words correct (<i>above typical progress</i>).	Meaningful: This goal achieves the benchmark and increases the odds of meeting future goals. Attainable: Tabitha is making typical or above typical progress. Ambitious: In areas where Tabitha is currently below benchmark, above-typical progress is appropriately ambitious.
<i>If Tabitha achieves this goal, she will be at or above benchmark on all measures by the end of year, and reading at an adequate rate with a high degree of accuracy for meaning.</i>	

Progress Monitoring

DORF
LEVEL
3

DORF/Level 3 Progress Monitoring Scoring Booklet



Because Tabitha started out below benchmark, her progress needs to be above-typical or greater to reach a score that is above the benchmark goal by the end of the year.

Alistair, Intensive Support Case Study

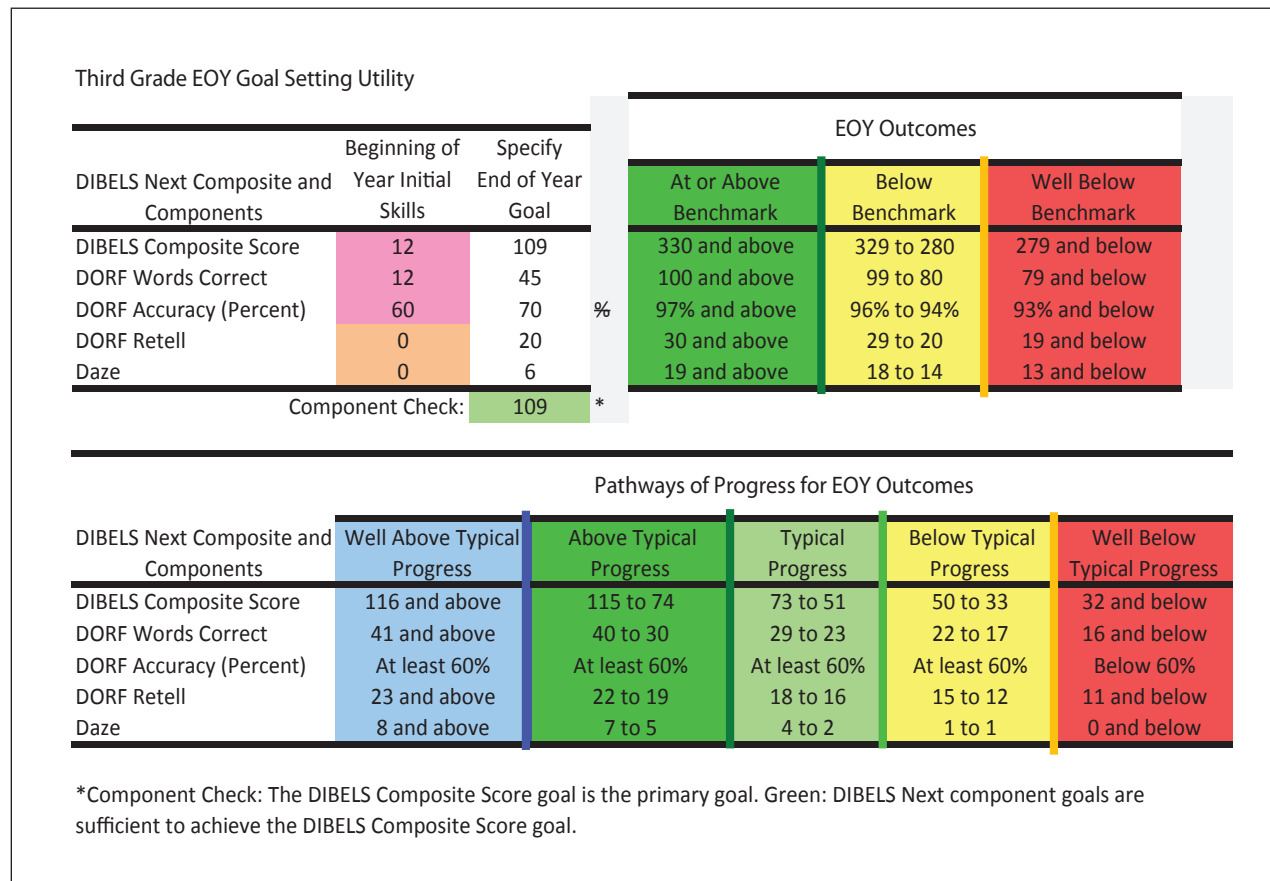
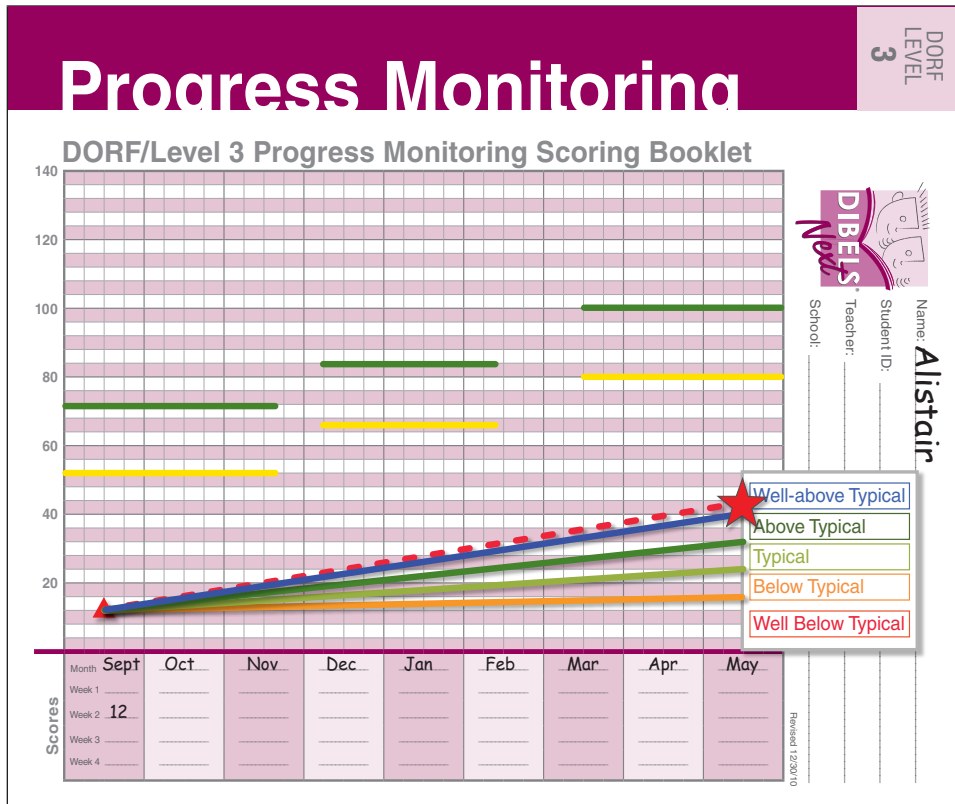


Figure 7: Alistair's Beginning-of-year DIBELS scores and end-of-year Pathway of Progress goals.

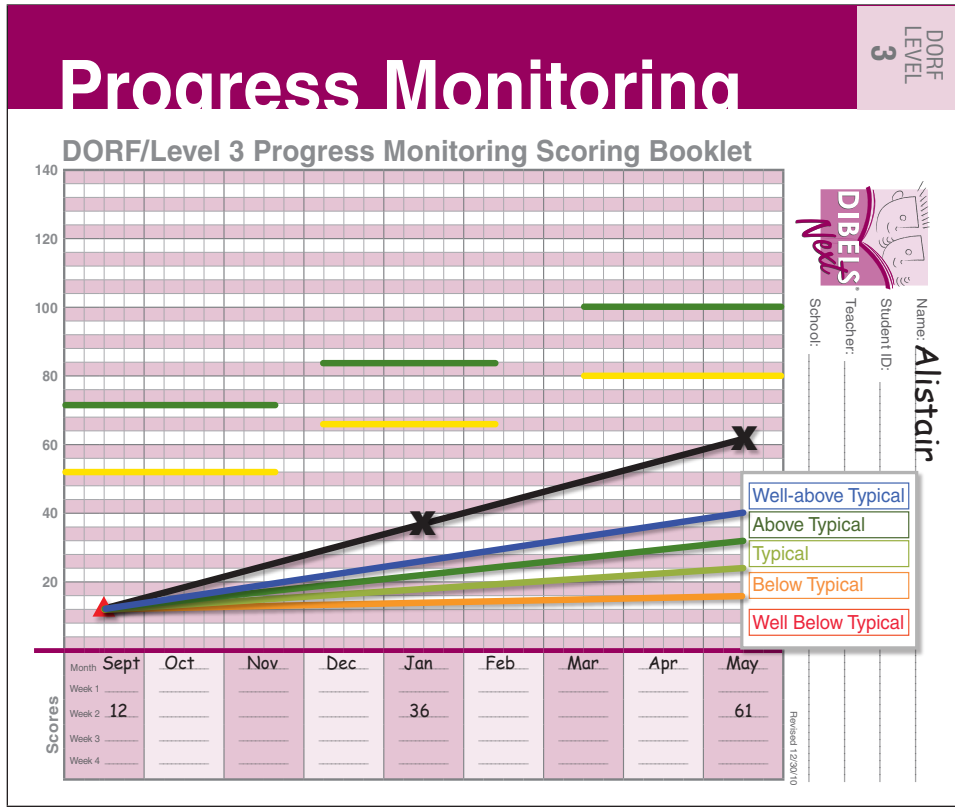
Alistair started out the school year below the cut-point for risk on the *DIBELS* Composite Score, and is likely to need intensive support to reach future benchmark goals.

Alistair would be an excellent candidate for *DIBELS Deep* to identify word reading and decoding deficits and *DIBELS Next Survey* to identify out-of-level progress monitoring level.

An appropriate EOY goal for Alistair would be...	Alistair's Goal is...
<i>Alistair will read grade-level text orally</i> - at a rate of 53 or more words correct per minute (<i>above-typical progress</i>), - with at least 75% accuracy (improve upon his current score), - be able to talk about what he has read with at least 20 words relevant to the passage (<i>above-typical progress</i>), - He will read grade-level text silently, using context for meaning, with a Daze adjusted score of 6 words correct (<i>above typical progress</i>).	Meaningful: The Pathways of Progress inform us that aiming for the benchmark goal is not realistic for Alistair, and that he will need a more intensive and long-term approach. Thus, in order to increase the odds of meeting future goals, Alistair needs to make <i>above typical</i> to <i>well-above typical progress</i>. Attainable: Alistair is already behind, but by focusing on what is possible, he can catch up by making <i>above-</i> to <i>well-above typical progress</i>. Ambitious: Above typical progress or greater is appropriate for Alistair given how far below expectations he is currently performing.
<i>If Alistair achieves this goal, he will be on his way to reading at an adequate rate with a high degree of accuracy for meaning. Using Pathways of Progress, we need to maintain above-typical progress to achieve benchmark status by the end of his fourth- or fifth-grade year.</i>	



Alistair's actual progress: Alistair made significant gains throughout the year, making *well-above typical progress* on DORF a rate of 61 words correct per minute, surpassing his Pathways of Progress end-of-year goal. He also made significant gains in other areas as well; he read with 88% accuracy, and was able to talk about what he read with 23 words relevant to the passage. He ended the year with a composite score of 139—*well-above typical progress*. *Alistair's teachers are ROCK STARS!*



But the support for Alistair won't end there, as he is still likely to require intensive support in the coming school year to reach his subsequent fourth-grade benchmark goals.

Sebastian, Benchmark Case Study

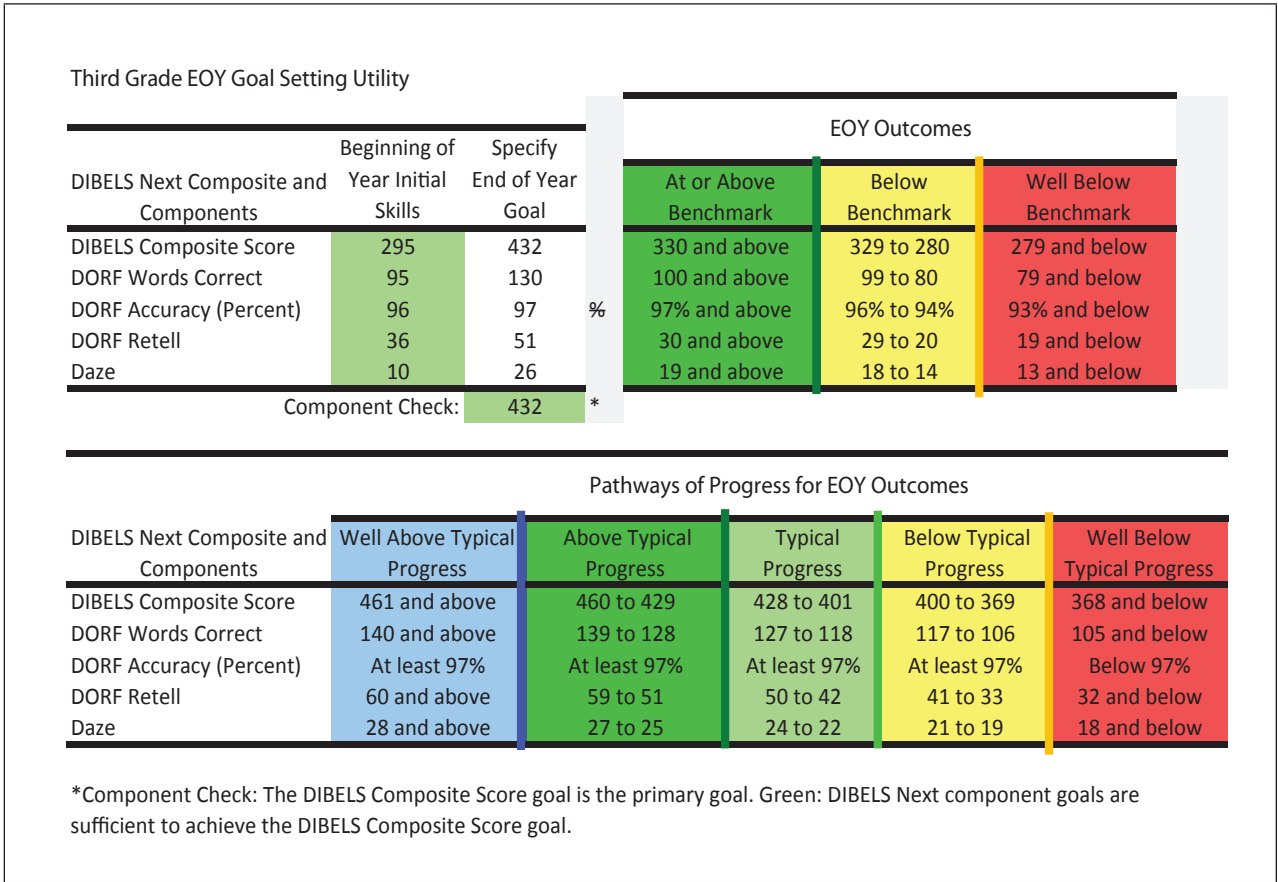
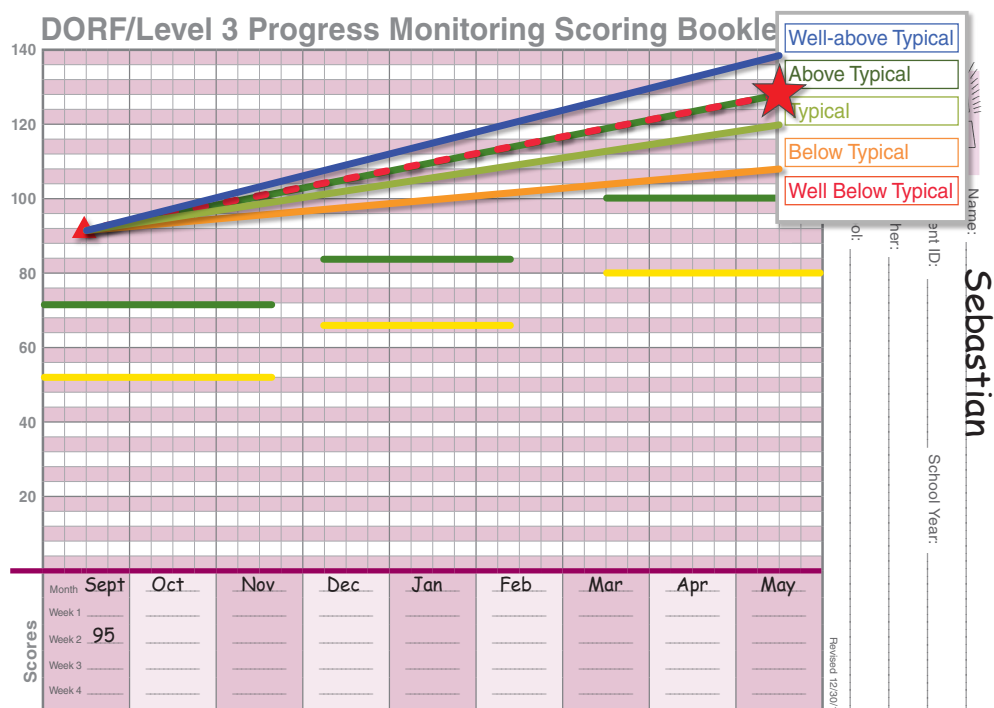


Figure 8: Sebastian’s Beginning-of-year DIBELS scores and end-of-year Pathway of Progress goals.

Sebastian began the school year well above the benchmark goal on the *DIBELS* Composite Score, and is likely to need core support. An evaluation of his scores revealed that he performed well on nearly every reading skill area.

An appropriate EOY goal for Sebastian would be...	Sebastian’s Goal is...
Sebastian will read grade-level text orally - at a rate of 130 or more words correct per minute (<i>above-typical progress</i>), - with at least 97% accuracy (<i>at least typical progress</i>), - be able to talk about what he has read with at least 51 words relevant to the passage (<i>above-typical progress</i>), - He will read grade-level text silently, using context for meaning, with a Daze adjusted score of 26 words correct.	Meaningful: TThis goal achieves the end-of-year benchmark goal and maintains Sebastian’s adequate progress. Attainable: Sebastian is making typical or above typical progress. Ambitious: Because Sebastian is well above benchmark at beginning-of-year, typical progress or greater is appropriately ambitious.
By the end of the year, Sebastian will read at an adequate rate with a high degree of accuracy for meaning. While Sebastian only needs to maintain at least typical progress, above typical or well-above typical progress is attainable.	

DORF LEVEL



Consider the quality of the data.

Consider the fidelity of the assessment.

DIBELS Next should be administered by trained personnel using standardized directions and procedures. Specific forms must not be used for practice or instruction. Practice and instruction should emphasize the skills, the form should be new to the student.

Do The Pathways Matter?

Are the Pathways of Progress meaningful for helping students achieve important end-of-year outcomes?

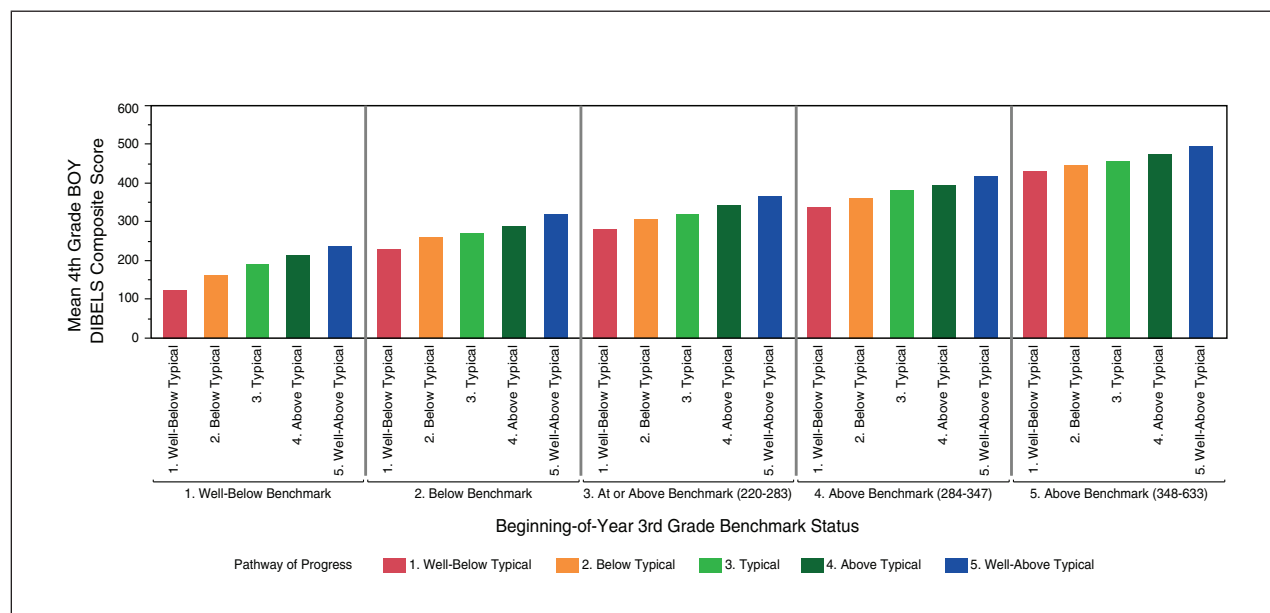


Figure 9: The impact of third-grade beginning-of-year benchmark status and Pathways of Progress performance on fourth-grade beginning-of-year DIBELS Composite Score.

If students are going to make reasonable gains throughout the year, those gains need to be related to important differences in outcomes. One important outcome for third grade instruction is the initial skills with which students enter fourth grade. As illustrated in Figure 9, beginning of third grade skills are an important predictor of beginning of fourth grade skills, explaining 67% of the variance. Student's Pathway of Progress in third grade contributes significant additional variance explained (6%).

For example, from Figure 9, students who are below benchmark and making at least typical progress or better are performing better at the beginning of fourth grade than students who are barely at or above benchmark (220-283) and making below to well-below typical progress.

Summary

The Pathways of Progress analysis is an innovative approach to setting individual instructional goals and evaluating individual student progress. Using the *DIBELS Next* Benchmark Goals and Pathways of Progress, educators are empowered to set goals that are meaningful, ambitious, and attainable for students at every level of initial skill. Pathways of Progress provides a normative context for evaluating progress compared to other students with similar initial skills. Pathways of Progress, when combined with the *DIBELS Next* benchmark goals and the *DIBELS Next* Composite Score, provides educators with important tools for examining where their students are, specifying where they need to get to, and evaluating whether they are making adequate progress.

References

Good, R. H., Kaminski, R. A., Cummings, K., Dufour-Martel, C., Petersen, K., Powell-Smith, K., Stollar, S., & Wallin, J. (2010). *Dynamic Indicators of Basic Early Literacy Skills Next*. Longmont, CO: Sopris. Available: <http://dibels.org/>.

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