

Assessment Result Calculations

Assessment Results Calculations

An assessment result has limited value if the administrator can not see a trend over time in how the student is performing. Therefore, the difference in academic performance between a previous assessment result must be calculated, but the difference in time must also be calculated in order to obtain a trend. The following terminology is used when making these calculations.

When there are multiple assessment result records associated with the one assessment code, the student is being tested multiple times on the subject area. The set of assessment results records creates a picture of how the student performs over time.

Each of these assessment result records can "look back in time" and calculate improvement since the last assessment result record associated to that same assessment code.

These calculations are performed on records in the [Assessment Results Table - TBD](#) in the [Students Module](#). They are not performed on any table in the Assessments Module.

Level Equivalent Assessments Calculations

PEMS uses hundreds/tens place pattern for its Level Equivalent scoring. The grade level is in the hundred's place, and the month is in the tens place. For example 840 is eight grade 4th month. Within a grade year, this is a quick visual reference for improvement, 800 compared to 860 represents 6 months of academic progress. Parents and student readily understand this system and it is easy to explain. A student starts a grade at 800, then increased by ten for every month in school. After the ninth month, the student has achieved 890. Then the student takes summer off and starts 9th grade at 900. 890 is the same as 900 under this system. This issue becomes important when calculating grade level differences in grade level achievement in some cases.

The level equivalent assessment measures the academic performance in terms of grade levels. Regular, expected grade level performance means that a student's level equivalent increases 1 grade level per 1 academic year, so a regular student's average improvement rate is 1.

For example, a student's assessment result record is linked to the assessment code record names "IXL basic arithmetic". At the beginning of the term, September 4, 2023, the student scores 720. This score means 7th grade second month. An assessment result record is made with date and score, linked to the assessment code, "IXL basic arithmetic" Four months later on January 5, 2024, the student scores a 840. This score means 8th grade 4th month.

- 4-SEP-2023 720 IXL Arithmetic
- 5-JAN-2024 840 IXL Arithmetic
- The difference in scores is: $840 - 720 = 120$ in improvement = 1.2 grade years of progress

- The difference in time is 5-Jan 2024 - 4-SEP 2023 = about 19 weeks = 1 term or half a school year.
- The student's improvement rate is $1.2/0.5 = 3.4$ grade levels per year (or 3.4 times the expected rate)

Naming Convention

- AP stands for Academic Performance, in the example above, AP is 720 and 840.
- The letter "D" stands for difference, just like delta or the 'd' in calculus.
- DT stands for the Difference in Time frame. Time is measured in terms, grade spans, and grade levels. In the example above, the difference in time is 19 weeks, but the difference in time frame is 0.5 academic years.

Examples

AP = Academic Performance, D stand for Difference, therefore:

- DAP = different in Academic Performance values between two assessment result records that are associated to the same assessment code record. In the example above, $DAP = 840 - 720 = 120$.

DT = the difference in time as measured in academic years, therefore:

- DTterm = the difference over a term
- DTGrade = the difference over the year
- DTSpan = the difference over the a grade span

Rate Calculations

DAPDTerm is the difference in academic performance divided by the corresponding difference in time. This is the near term outlook, looking at how the student is progressing term by term.

DAPDTGrade is the difference in academic performance divided by the corresponding difference in time. This value looks at how the student performed in a giver academic year.

DAPDTSpan is the difference in academic performance divided by the corresponding difference in time. This value takes the widest look at progress over a longer horizon.

Time is always measured in portion of academic years

At any one point in time the student may not have completed a whole term, a whole grade level, or a whole grade span. Time is between assessment results is always measured in units of academic years. The DT or "delta time" is derived from the difference of the assessment result in days divided by the number of days in an average academic year.

Selecting the correct DAP - which assessments results to use

A student may take an assessment at anytime in the academic school year. When calculating time frame differences, PEMS selects the most relevant historical assessment record.

- For the term time frame, PEMS finds the oldest assessment within the current term.
- For the Grade time frame, PEMS find the oldest assessment result at the students current grade level.
- For the Grade Span time frame, PEMS find the oldest assessment result within the grade span.

For a new student that has only two similar assessments, the all values above are the same. The values are only different as more assessments are taken. In the second term the DAPDTGrade uses the very first record, while the DADTerm uses a more recent record to make the calculation.

Percentile Rank

A percentile rank stores a student's score relative to a wider population of students. However, a raking is always against a similar grade level. For example, a student may be in top 90% of sixth graders if in sixth grade.

Because percentile rank is still measured against grade level, the calculations are no different. The student in one term may increase from 60% rank to 65% rank in 0.5 years. The student's rate of progress is $(65-60)/0.5$ years or 10% climb per year. For the grade span calculation, If the student climbed from 60% rank to 85% rank over 2.5 years, then the rate is $(85-60)/2.5$ or 10% per year.

Note: Because the student transitioned from being ranked against 6th grades to being ranked against 8th graders is not material since the student's own grade also advances.

Calculations Workflow

When ever a new assessment result record is entered, each result is associated to an assessment code.

PEMS searches for prior assessment result records, and calculates the difference in academic performance between assessment result records and the difference in time frames. Then PEMS calculates all the various parameter explained herein.

There is no need for this algorithm to be triggered on the event, the algorithm can run nightly to update all assessment result records.

Once entered, these values are never recalculated.

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