

# 2017-18 ALN Event #3: **James Gullen, Ph.D.** *MAC Board Member and Assessment Resource Developer* Contact: [jgullen@michiganassessmentconsortium.org](mailto:jgullen@michiganassessmentconsortium.org)

Event resources: Link to the PowerPoint and all related resources from this event-- <http://aln.michiganassessmentconsortium.org/content/march-2-2018-resources-presenter-james-gullen-phd>

## Morning discussion:

### Group shared some common issues they are experiencing (or hearing about) related to measuring and attributing student growth

Issues reported out include:

* ALN members sense that the ability to measure growth accurately and fairly is uneven across grades and subjects
* ALN members report that there is a lot of distrust of metrics, and in the absence of clear guidance, many districts are using “common sense measures”
* There is a lot of confusion among educators about what “growth” is “under the law.” They report perceiving that the law is actually very vague on what constitutes “growth.”
* The field tends to want to buy solutions (testing or data solutions) since it’s difficult for every district to do this on its own

## Keynote Presentation Notes: “Measuring Student Growth: So Much More than Subtracting Two Numbers”

### **Key takeaway:** When you’re choosing a growth model, it’s important to consider things like scale, the type of data you’re feeding into the growth model, and the appropriate interpretations of the model.

### **Highly recommended resource:** A Practitioner’s Guide to Growth Models, Katherine E Castellano and Andrew D Ho (2013).

* Downloadable from: <http://scholar.harvard.edu/files/andrewho/files/a_pracitioners_guide_to_growth_models.pdf>
* The afternoon presentation was loosely organized around this book.

### **Key Ideas:**

We think we all understand growth; but measuring academic growth through a growth model is far more complex than some may recognize

“The fact that you are using advanced statistical techniques doesn’t relieve you of your responsibility to think.”

Even though growth models are available to purchase, you need to be clear about what you actually want to know about student learning. Different growth models may be interpreted differently.

Dr. Gullen described seven “flavors of growth models” **[slide 25]**

* Gain Score
* Trajectory
* Categorical
* Residual Gain
* Projection
* Student Growth Percentile
* Multivariate

1. Gain Score Model **[slides 26-32]**
   1. Simplest and most intuitive
   2. Growth is expressed in absolute terms
   3. Data at two points is required
   4. Growth is given by a simple equation
   5. Problem: Scale is very important - (see associated slides)
2. Trajectory Model **[slides 29-33]**
   1. Extension of the gain score model
   2. Projects the observed gain score (slope) out a number of years to predict future performance
   3. Based on consistent linear growth—but is this reasonable? (History indicates maybe not)
   4. Similar scale requirements as gain score model
   5. Presents a few options for aggregating
   6. Questions to ponder: Is it fair to hold teachers accountable for something that has not happened yet or might not happen?
3. Categorical Model **[slides 34-40]**
   1. Based on movement among proficiency categories (not proficient, proficient, etc.)
   2. Communicates growth as progression from one category to another
   3. Addresses some scale concerns—but relies on some assumptions
   4. Michigan’s previous “performance level growth” model is an example
   5. Gullen’s recommended book (see above) makes this topic more accessible and would be worth exploring for those who are interested.
4. Residual Gain Model **[slides 41-55]**
   1. Starts with a linear regression model to model performance
   2. Actual performance is then compared to the predicted performance from the model
   3. Residual = actual - predicted
   4. Positive residuals indicate more observed growth than modeled. Negative residuals indicate less observed growth than modeled.
   5. Some challenges exist
      1. Not all relationships are linear
      2. If least-squares regression is used, this is a norm-referenced interpretation
      3. Questionable implications for aggregation
      4. Relies on some assumptions:
         1. Assumes a linear relationship between variables
         2. Makes assumptions about the distribution of the data
         3. Makes assumptions about the relationships between aspects of the model
         4. If these assumptions are violated, interpretations of growth may be difficult
5. Projection model (more advanced way of handling trajectory model) **[slides 56-62]**
   1. Fitting and diagnosing a linear regression model takes quite a bit of effort **(slide 58 describes a 4-step process)**
   2. Strength: can be used to identify at-risk students while there is still time to take instruction action to improve learning as measured by test 2
   3. Problems:
      1. The strength of the model is early warning; so intervention will skew the projection
      2. Requires a large number of students to fit the model
6. Student Growth Percentile **[slides 63-70]  
   *(Dr. Gullen engaged ALN members in an activity to illustrate this concept—the activity documents have been added to the ALN resource page so others can use it)***
   1. Strength—works well alongside proficiency measures
   2. Presents student growth compared to students with similar score history
   3. Conceptually simple; in practice, quite complicated
   4. No strict scale requirements
   5. Norm referenced; what implications does this have for accountability?
   6. Two methods of aggregation **(check slide 69 for more)**
7. Multivariate model **[slides 72-74]**
   1. Bit of a misnomer; there is no default multivariate model
   2. A wide variety of statistical methods can be employed
   3. Models need data to work with; data requirements are extremely complex
   4. Often used within so-called “value-added” modeling
   5. Caution is urged, especially in assigning causality

Classifying Growth Models:

* Three over-arching uses/interpretations
  + Growth Description
  + Growth Projection
  + Value Added
* See **slide 77** for classification of each model described above.