



ONE MASSACHUSETTS AVENUE, N.W., SUITE 700 • WASHINGTON, D.C. 20001-1431
202 336 7000 TEL • 202 408 8072 FAX
WWW.CCSSO.ORG

Memorandum to Chief State School Officers: Growth Models Primer

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Rolf Blank, Director of Education Indicators

Lori Cavell, Associate

***Background:** There has been growing interest in the use of growth models in state accountability. Based on expressed needs, CCSSO has coordinated information sessions, conferences, and resources to answer state questions on growth—from the model foundations to the more technical issues in implementation. In 2004-05, CCSSO has held fall and winter meetings of states and experts to discuss issues in use of growth models. The topic has also been on the agenda of recent meetings of the CCSSO Accountability Systems and Reporting (ASR) state collaborative, and the collaborative will produce several products shortly including a white paper on growth models for school accountability, a glossary of terms, and a “frequently asked questions” resource.*

This memo is designed to answer many of the current questions about what growth models for accountability are, and what they are not. It discusses growth models in relation to status and improvement models and summarizes the following: 1) types of growth models and their purpose(s); 2) the advantages and disadvantages of growth models; 3) challenges to implementation and resource requirements; 4) use of growth models under No Child Left Behind (NCLB); and 5) policy questions that may shape state decision making regarding the use of growth models for accountability.

Purpose of Growth Models for School Accountability

***Growth models** generally refer to models of school accountability that measure progress by tracking the achievement score or proficiency level of a student cohort from one year to the next with the intent of determining the progress made. So, for example, learning growth would be measured by observing the aggregate performance of this year's fourth graders as opposed to scores for the same group last year in third grade. By comparing data for the same group of students over time, accurate measures can be obtained of the degree to which students have made expected improvement in learning as compared to a statewide or local target. (Growth models differ from *improvement models* of school accountability that measure progress by tracking improvement in different student cohorts; that is to say, the performance of this year's fourth graders compared the last year's fourth graders.)*

Growth models for school accountability place increased demands on state resources, but offer valid measures of the degree to which education in a school is actually improving. Most states now have the core ingredients in place of criterion-referenced statewide assessments and performance standards for defining achievement levels, and by next year almost all states will have assessments in consecutive grades 3-8 in math and language arts. Currently, about half the states have in place another essential component, i.e., statewide individual student record data systems (which many states have recognized as extremely useful for implementing AYP analyses and reporting under NCLB). For these reasons, more states are now asking whether growth models of accountability would be an appealing option.

A commonly referenced type of growth model is a value-added model. *Value-added models* are one type of growth model in which states or districts use student background characteristics and other data as statistical controls in order to isolate the specific effects of a particular school, program or teacher on student academic progress. Achievement growth over time at the school level is then the aggregate of growth for individual students controlling for each student's background and prior achievement.

A well-known value-added model is the Tennessee Value-Added Assessment System (TVAAS). Like all growth models, TVAAS tracks the aggregate yearly growth in student learning. However, this model measures student growth by linking it to each student's prior performance and the teachers and schools they experienced. Thus, the model can accurately attribute the growth in performance of students to the specific school and teachers they experienced during a specific time period. Largely because of the media coverage of TVAAS, value-added models have often been associated with teacher evaluation. The main purpose of value-added models, however, is to separate the effects of non-school related factors (such as family, peer, and individual influence) from a school's performance at any point in time so that student performance can be attributed appropriately. Although many scholars agree that value-added models will provide data to establish a school effect or a classroom effect there is less agreement that the models can be used to accurately distinguish the effects of a single teacher.

Status models are often held in direct contrast to growth models. A status model (such as Adequate Yearly Progress [AYP] under NCLB) takes a snapshot of a subgroup or school's level of student proficiency at one point in time and compares that proficiency level with an established criterion. In AYP, that criterion is the annual measurable objective (AMO – or the level of proficiency the state established as a goal for schools and students). So, progress is defined by the percentage of students achieving at the proficient level and the school is evaluated based on whether the student group met or did not meet the goal. Although not required by the legislation, the data used for AYP determinations might also be used in an improvement model to compare proficiency levels of the same grades from one year to the next (that is to say, this year's percentage of third graders meeting the proficient level as compared to the percentage for last year's third graders). Such tracking of changes in proficiency levels over time has only a small role in NCLB accountability, and this is with the "safe harbor" provision (which applies when the number of below proficient scores of a student group is decreased by 10 percent from the prior year's comparable student group).

Many States Track Improvement in Assessment Scores

Measuring educational progress based on tracking improvement in state student assessment results has existed for some time. In 1991, for example, Kentucky implemented a school-level index that measured improvement of scores on state assessments in all core subjects. The Kentucky model measures *improvement* in student assessment scores for a school by successive groups, (e.g., third grade scores from 2005 are compared to third grade scores from 2006). Improvement models (which now exist in many states) were a useful advance for statewide assessment reporting. They emphasized annual targets for improving assessment scores, and improvement models moved many states away from ranking schools on static annual assessment scores. Today, states are considering moving beyond tracking successive cohort improvement to measuring growth by tracking individual student's progress over time.

Advantages and Disadvantages of Growth Models

The recent focus on growth models is due to their perceived benefits. Growth models give credit to schools and students for progress made regardless of the distance from a set target point or goal. Growth models compare the same students across years and thus reduce errors due to student mobility, reassignment of teachers, or other within-school factors (that would occur if one was comparing different cohorts of students across years). Thus, they can illuminate when significant gains in student learning have occurred (or conversely, where dangerous dips in learning have occurred). Moreover, the data-robust value-added models also enable educators to identify changes in learning that are actually due to school, curriculum, or teacher effectiveness.

While much attention has been paid to the inadequacies of the AYP measure, less attention has focused on issues with growth models. Growth models do allow states to recognize movement toward proficiency, however, taken in isolation, such models could imply that only positive growth is important, and that schools are not expected to have all students achieve at a proficient level. While the AYP model does hold schools, districts and states accountable for the learning of all students measured against the same bar, growth models do not inherently have a universal goal. Longitudinal growth models can be designed to measure student growth towards a target, such as the state-defined proficient level (Gong, 2004). Many existing models have begun measuring growth in relation to some type of observed average growth, but not necessarily a state-established proficiency level. In addition, expected growth may vary within these models depending on students' past performance (i.e., models account for expected variations in rate of growth). "Low-performing students who are assigned weaker teachers are predicted (expected) to make less growth than higher-performing students who are assigned stronger teachers" (Gong, 2004).

Other issues should be considered. Growth models do add significantly to the size and scope of a state accountability system, and may require states to provide greater research and analysis expertise, as well as support for struggling schools. As with all accountability models, if a growth model is not implemented with precision and accuracy the model could inappropriately place blame for declining or stagnant levels of student growth on teachers, programs, or schools. Moreover, growth models highlight problems for which it will be necessary to develop strategies to ensure that low-performing students receive programmatic help to improve their performance.

Challenges and Resource Requirements

Most states are familiar with the challenges of building data systems for accountability. As might be expected, in order to implement a growth model many states will have to enhance their existing assessment and data systems. To measure student growth, states must have annual assessment in successive grades; student identifiers that allow for individuals to be tracked across time and schools (unless quasi-longitudinal); vertically-scaled/aligned assessments and grade-specific performance standards; and at least two-years of data (Gong, 2004). (In addition, value-added models require student background data and data on teacher assignments and courses each year.) Of course, such robust data sets are not easily built or maintained. They require extensive hours in development, syntax and semantics quality checks, and human resources to interpret and report on results. Due to their great demand on resources, the data system requirements present the most significant challenges to implementation of growth models.

Growth and NCLB

As evidenced by the integration of “safe harbor” into accountability under NCLB, measures of improvement and status can be combined in a single accountability system. To date, however, the U.S. Department of Education (ED) has not allowed growth measures to be incorporated directly into the formulae for AYP determinations. States with growth models in place have either incorporated measures of growth into their statewide accountability systems beyond NCLB, or relied on improvement measures to supplement NCLB (such as many of the existing state established indices). However, all of these states maintain reporting of AYP results for each school and district, as well as additional measures of student progress defined by state policy. There is little available research on systems that combine growth models with AYP. Scholars agree, however, that use of growth models in combination with AYP accountability could increase the validity of decisions made under the system. Thus, states with an interest in growth should continue to pursue their options, and to have conversations with ED about the best ways to incorporate such a model into their statewide system to meet the aspirations of both state and federal accountability.

Summation

As you review this brief, keep in mind that if a growth model is to be an option for your states as they make adequate yearly progress determinations for the 2005-06 year, such inclusion must be indicated to ED April 1, 2005. On the last page of this brief we have included some of the critical policy questions that can be answered by the models described in this paper. If you need more information on growth models as you construct your letters or examine accountability in your state, please do not hesitate to contact me at (202) 336-7044; rolfb@ccsso.org. We also have online resources from our November 2004 “brain trust” meeting that can be accessed at http://www.ccsso.org/projects/Accountability_Systems/5508.cfm.

Policy Questions Answered by Status, Improvement and Growth Models

Status:

- What is the proportion of students scoring below, at or above proficient on state assessments?
- Which groups of students are not reaching the defined target and what can be done to improve their performance?

Improvement, includes all “status” policy questions plus:

- How high are this year’s students scoring compared to last year’s?

Growth, includes all “status” and “improvement,” policy questions plus:

- How much did students learn as compared to student scores at a prior point in time?
- How does the progress of one subgroup of students compare to that of another?
- What is the rate of progress in learning at a particular school? Are students meeting (exceeding) expected growth?
- Which schools exhibit the highest levels of student growth? [Value-added models can answer all of the above and the question: “To what can we attribute the growth (or lack thereof) in student learning?”]