Serving all students with a Standards-based Computer Adaptive Test

Background

In 2011, the U.S. Congress began discussions and debate about the reauthorization of the Elementary and Secondary Education Act (ESEA) most recently reauthorized in 2001 as the No Child Left Behind Act. In order to provide a framework for how the needs of students with disabilities should be addressed in ESEA, the Consortium for Citizens with Disabilities Education Task Force developed key Principles for the ESEA Reauthorization (see: http://www.c-c-d.org/task_forces/education/tf-education.htm). The following principle represents CCD's position on assessment design and application to students with disabilities:

> **Assessments must be designed and implemented to ensure that all students can accurately demonstrate their academic knowledge and skills.** National, state, district and classroom based assessments must utilize the principles of universal design for learning to ensure that all students – including those with disabilities – can meaningfully demonstrate their knowledge and skills, thereby providing a more accurate understanding of student academic performance for evaluation by educators, families and policymakers. This "next generation" of assessments that are being designed in alignment with the Common Core State Standards must consider the needs of diverse learners from development, rather than attempting to retrofit assessments during their implementation. The assessments need to be based on the academic standards for the student's enrolled grade. An assessment can only be considered an accurate picture of a student's knowledge and skills if it is designed to allow students to most effectively demonstrate and express what they have learned in their grade.

As part of the ESEA, certain states have redesigned their annual state assessment systems to move students into a computerized testing environment. This is typically called computer-based testing. Other states are utilizing new assessments that are both computerized *and* adaptive which is typically called computer-adaptive testing (CAT). Additionally, the 46 states that have agreed to adopt the common core standards in reading and math will be using either a computer based test or a computer-adaptive test as designed by the assessment consortia beginning in 2014-2015.

Note: Some states use computer-adaptive tests within the school year -- often at the end of a particular unit that has been taught to help teachers know whether students understand the content and are gaining identified skills – this is often referred to as *formative testing*. For the purposes of this paper, we are not focused on formative testing, but on the annual use of computer-adaptive tests – typically at the end of the school year – to benchmark student progress against grade level standards.

Purpose and Characteristics of Well-Designed CAT
Computer adaptive tests have the potential to greatly improve our ability to better measure what all students know against state standards. Several states are using them now (HI, OR, DE). These tests are able to adjust the difficulty of the items presented to a student as the testing takes place. Students who are struggling with the test items receive easier questions while those who are excelling receive more difficult items. Importantly, statistical models underlying a well-designed computer adaptive test ensure that all students receive scores that are comparable to their same age peers judged against the state reading or math standards.

In a traditional test, all students answer the same questions. Students at either end of the academic scale—struggling learners or advanced learners—find the bulk of the questions either too easy or too difficult. Very easy or very difficult items provide little information about what a student knows or can do. As a result, the proficiency of students may not be accurately assessed.

While well-designed adaptive tests bring many benefits, poorly designed adaptive tests can result in unacceptable consequences, including locking lower performing students into the simplest content. For example, a poorly engineered adaptive test risks testing lower performing students only on cognitively simpler skills such as recall, recognition and rote applications of mathematics. Furthermore, because the assessment will never test lower performing students on more difficult and/or cognitively complex items, it risks creating a situation that encourages teachers to limit the curriculum and instruction for lower performing students to the simplest tasks. Thus, teachers may avoid focusing on critical skills such as higher level problem solving and analysis.

Similarly, a poorly designed adaptive test can deny students an opportunity to demonstrate their knowledge across the grade level content. It is important to keep in mind that difficulty and cognitive complexity *are not the same*. To underscore the point *difficulty* is a statistical concept related to the proportion of students who answer an item correctly. *Cognitive complexity* refers to the intellectual challenge posed by the question.

> **Fifth Grade Math Example**: A test item that says, "Draw four different quadrilaterals" is cognitively complex because the student must know the properties of quadrilaterals (four-sided closed figures), understand the features that distinguish among them, and create a picture using that knowledge. It turns out that most fifth graders can answer this item correctly, so it is considered fairly easy though still *cognitively complex*.

> **Fifth Grade Reading Example**: Describing the traits of a character in a story can be quite cognitively complex because it often involves integrating information across paragraphs and making inferences about the relationships between actions and traits. When the on-grade reading passage uses simpler language, involves characters with fewer relevant traits, or uses less symbolic language the task may be easier, while still requiring the same higher-order thinking skills.

A good computer adaptive test adjusts difficulty while testing all students on higher order skills. That means the test ensures that all students respond to cognitively complex items, even while some students see easier items than others. It is providing this full range of cognitive complexity that allows an adaptive test to expand rather than limit what is being tested on grade level curriculum.

Recommendations:

In order to inform the policy discussion regarding appropriate use of standardized assessments to determine student proficiency on state standards *and* for any accountability purposes, including within a growth model, the Consortium for Citizens with Disabilities offers the following:

The key characteristics of a well-designed, standards-based computer adaptive test are defined as an adaptive assessment for which the following facts hold true:

1. **Every student is tested on the full range of grade-level content with no discernible differences in the content assessed.**
2. **Every student is tested on items measuring the same mix of cognitively complex skills, with no discernible difference--regardless of student proficiency.**
3. **Every student is tested on items reflecting the full range of other aspects of the grade level curriculum as may be appropriate for the grade and subject; and**
4. **Every student is tested on items that provide the best measurement possible within these constraints.**

Rationale for each recommendation:

1. **Every student is tested on the full range of grade-level content with no discernible differences in the content assessed.**

This does not require that every student see every item on every content standard. Rather, *each student should see a representative and substantial sample from the content*. The content should not be systematically different for some groups of students.

2. **Every student is tested on items measuring the same mix of cognitively complex skills, with no discernible difference regardless of student proficiency.**

This requires similar cognitive complexity but not necessarily similar item difficulty. For example, an item measuring a student's planning and problem solving ability may be more or less difficult based on the range of possible solutions, the amount and type of background information necessary to understand the item or the number of steps in the solution. A test item can be cognitively complex without being particularly difficult and an item can be difficult without necessarily being cognitively complex.

3. **Every student is tested on items reflecting the full range of other aspects of the grade level curriculum as may be appropriate for the grade and subject.**

This requires attention to all the important aspects of the curriculum. For example, knowing the difference between literature and informational texts is very important, but may not be explicitly stated in the content standards. In such instances, every student should see a comparable mix of literature and informational passages in the curriculum and in test questions that are provided.

4. **Every student is tested on items that provide the best measurement possible within these constraints.**

This requires that, within these constraints, the test adapts to the proficiency of the student to provide the *best measurement available* about what students know and can do. The first three statements impose requirements on the content on which the students are tested, and these requirements ensure that the test measures the full range of the intended grade-level curriculum.

A test that ensures that *all students are measured on the full range of the intended curriculum* establishes incentives for schools and teachers to give every student the opportunity to learn the appropriate grade level material.

Sincerely,

Association of Assistive Technology Act Programs
Association of University Centers on Disabilities
Autism National Committee
Conference of Educational Administrators of Schools and Programs for the Deaf
Council for Exceptional Children
Council for Learning Disabilities
Council of Parent Attorneys and Advocates, Inc.
Easter Seals
Higher Education Consortium for Special Education
Learning Disabilities Association of America
National Association of State Directors of Special Education
National Center for Learning Disabilities
National Disability Rights Network
National Down Syndrome Society
School Social Work Association of America
Teacher Education Division, Council for Exceptional
The Advocacy Institute
The Arc of the US
United Cerebral Palsy

See CCD's website for more information on students with disabilities. www.c-c-d.org

The Consortium for Citizens with Disabilities is a coalition of 1115 national consumer, advocacy, provider and professional organizations headquartered in Washington, D.C. Since 1973, the CCD has advocated on behalf of people of all ages with disabilities and their families. CCD works to achieve federal legislation and regulations that assure that the 54 million children and adults with disabilities are fully integrated into the mainstream of society.

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