Computer-Based Assessments and Accommodations: Has the Universal Design for Assessment Era Arrived?

Re-published with permission from Family Center on Technology and Disability
Technology Voices – April 2009
Computer-Based Assessments and Accommodations: Has the Universal Design for Assessment Era Arrived?

An Interview with Michael Russell, Ph. D., president and research director, Nimble Assessment Systems; associate professor, educational research, measurement and evaluation, Boston College; director, Technology and Assessment Study Collaborative (inTASC)

Classroom accommodations for students with cognitive and physical disabilities are commonplace. Now there is a movement underway to transition classroom accommodations to assessment and testing environments using computer-based technologies. In fact, a universally designed assessment system that Dr. Michael Russell of Boston College calls NimbleTools might help to eliminate entirely the need for most accommodations.

Universal design (UD) principles have been aimed at making the general curriculum more accessible. Can these principles also be applied to test accommodations? Dr. Russell believes they can. “Universal Design for Learning is really about making content accessible for as many students as possible, which means that there has to be flexibility in the way it's presented. It’s about increasing students’ engagement with that content. It’s about allowing students to reveal what they know and understand through multiple methods. It’s about trying to match students’ access needs, engagement needs and response needs with tools that present information in an accessible and engaging manner.”

In an assessment, he explains, there are two components: consideration of ways students access, engage with and respond to test items; and provision of tools that will improve those three elements.

“It starts with the item writing process and thinking specifically about what an item is attempting to measure. What elements of the item are not essential in the measurement of skill and knowledge? What information can we present in alternate
ways so that we can make it easier for students to access content, be engaged with it and reveal what they understand?”

**Universal Design for Assessment**

Educators, he says, provide accommodations when students are learning in the classroom. “By adopting a Universal Design for Assessment perspective, the accommodations typically provided in the classroom are provided by the computer for each test item. But to do so effectively, the test developer has to determine what elements of the item are essential given what is being measured and what elements may decrease engagement.”

What Dr. Russell is learning, he says, “is that our focus on the presentation component – what can be viewed and presented in different ways on a computer – has created new possibilities and will force item writers to rethink a given test item. “In many cases we are trying to convert items originally designed for paper to a computer-based environment. In doing so we find that there are some items that are so poorly designed in terms of access that it is very difficult to create alternate ways of presenting them so that students with different access needs can fully engage with the test question.”

Some items contain irrelevant information in the prompts and can be rewritten. In other cases the items contain graphics that are unnecessary and/or contain irrelevant information. “Sometimes the graphic does not accurately represent what the text states. If the student is graphic-oriented she will be thinking about the item one way whereas a text-oriented student will think about it another way. The goal is to ensure that the graphic elements are aligned with the textual elements.”

**Eliminating the Need for Accommodations: a Lunch Buffet**

Ultimately, Dr. Russell predicts, universal design principles “are going to decrease the need for what we have traditionally regarded as accommodations. By definition an accommodation is an out of the ordinary action taken to meet a specific need, whereas a universal design item in a UD system does not require any additional actions to make it accessible and engaging for a variety of students.” Universal design principles, he points out, aim to allow students to make choices. “If we provide students with options as to how they access and engage with test
content and then allow all students to make choices among those options, a large percentage of what we’ve regarded as accommodations will simply go away.”

The objective “is to educate students so that they make smart choices, empowering students as opposed to putting pressure on testing programs and schools to take additional actions and incur additional costs to make an accommodation.”

Dr. Russell employs the analogy of a lunch buffet to illustrate the benefits of universal design. “A universally designed lunch buffet will contain many choices to meet the needs of many individuals, whereas a non-universally designed buffet will offer only ham sandwiches on wheat bread. The tastes of many can be accommodated only by asking the server to make something special. That’s what we’ve been doing with accommodations for many years. But if you offer the entire lunch buffet, special orders are no longer necessary.”

**Ten Years Ago: Heresy**

Ten years ago, according to Dr. Russell, a transition of classroom accommodations to a computer-based assessment format -- even one with a universal design foundation -- would have been considered heresy. “It was gospel that a student should not have an accommodation during testing or have access to a tool during testing that is different from what is used for classroom learning.”

The reason for the existence of that orthodoxy, he explains, “was that many of the accommodations that are now common in a classroom context were either expensive to provide in a testing environment or involved human assistance which some felt lead to unintentional hints.”

That orthodoxy is eroding fast, he points out. “With computer-based technologies widely employed and with a general recognition among educators that assessment is different than learning, many educators are beginning to realize that there are some tools that can be available during classroom assessment and during large-scale statewide standardized tests that may be different from those used in classroom learning. In addition, some educators are also recognizing that some students who have not been identified with a need may still benefit from the accessibility tools that can be built into a computer-based test.”
High Stakes Testing: 100% Accuracy Is a Must

Take, for example text-to-speech software. In a learning context, says Dr. Russell, “text-to-speech software is very effective because it can access electronic text and read it aloud to a student who has reading needs.”

In a learning context, he notes, “it is probably tolerable if 1% of the time the software makes an error by mispronouncing a word, for instance, because there are other ways for a student to get support. If the student is unsure she can ask the teacher. She might be able to ask a friend. The stakes associated with students not being able to access a piece of information at that moment are pretty small.”

In a testing context, however, the stakes are exponentially higher. “Having anything misread is potentially very problematic,” he says. “If a student is using a specific type of text-to-speech software in the classroom because it is cheap, available and functions relatively well that is OK. But in an assessment context if that software makes an error on a critical word related to a given test item, that is not acceptable.”

Continues Dr. Russell: “If there are other tools built into the testing platform that can provide 100% accuracy, even if they are not the same as those the student has been using in the classroom – the tools function similarly but may not be identical – it seems reasonable that students should use the tool that’s 100% accurate as opposed to one that is 99% accurate as long as the student has had the opportunity to use the tool prior to testing.”

Gaining access to the most accurate tool prior to testing is easy, he insists. “Every state has released test items. Many states have these items on computer. Therefore there is no reason why the same interface and tools should not be available for those practice items so the students can become accustomed to taking the test in that format in a practice session at home or in the classroom.”

He compares this approach to the use of scan sheets by classroom teachers. “If you take this argument to the extreme, you can ask, ‘How many teachers use scan sheets in their classroom? To what extent are bubbling in answers on scan sheets a part of regular classroom behavior, whether the student has disabilities, special needs or not?’ They’re not part of a normal classroom environment. Most teachers
never have their students bubble in, except when it’s time to prepare for a test. It is only in preparation for the test that teachers expose students to that type of item and testing format. Given this situation, one might argue that since bubbling in answers on scan sheets is not a part of typical classroom practices then students should not be allowed to use scan sheets during testing. The absurdity of this argument applies to well-designed tools that can help students access and engage with content during testing.”

Although the importance of human involvement in accommodation administration has been sharply reduced by 10 years of technological advances, it continues to exist and remains a factor, Dr. Russell explains.

The level of human involvement depends on the needs of individual students, he notes. “Some students in an assessment context continue to require human assistance to help them navigate through a test, find materials and work with materials. Humans used to conduct read-aloud or signing of tests. A teacher would stand before the students to do read-aloud or work individually with students to read items one by one or in a group setting. The same with signing. An interpreter would sign content. Now the human can be removed from the process in a computer-based environment and we can guarantee that all students are provided high-quality, accurate reading or signing of test content.”

**Accommodations Policies Vary by State**

Universal Design for Assessment, he predicts, may eliminate the policy differences between states and localities regarding accommodations. Even today, however, “there are certain types of accommodations that are fairly standard across states. These accommodations include reading aloud of text for students with certain disabilities and presentation of material to students who are blind or visually impaired and are Braille readers in a Braille context.”

Other types of accommodations, such as the use of auditory calming tools or policies regarding the signing of items or the use of tools like pencil grips vary from state to state, he says.
Among the most common accommodations is extended time. Many students with special needs or disabilities require additional time when taking a test, sometimes because they are receiving another accommodation and sometimes because it takes longer for them to work through problems, Dr. Russell explains. Read-aloud is the second most common accommodation. “After that the numbers decrease significantly,” he notes. “It depends on the content being measured. In writing tests, for instance, every state has a number of students who will use scribes to help them compose text. Every state allows Braille versions or large-print versions of tests.”

Some states, however, designate many more types of accommodations, he notes. New Hampshire, for example, allows 15-25 types of accommodations with provisions to make special requests for additional accommodations. New Hampshire’s accommodations even include the use of pencil grips or large pencils. When making decisions about accommodations, he says, “It is important to separate tools and strategies students use to access and record their thinking from alterations that are made to a test administration to improve access and engagement versus modifications that are made to the actual test items.”

**Accommodations Don’t Alter What Is Measured**

According to Dr. Russell, “There is an important difference between an accommodation and a modification. The common understanding in the field is that an accommodation does not alter what is being measured, it alters the way that students are accessing information or providing responses but not what is being measured or what the student is trying to learn.”

Generally, he adds, “an accommodation does not change the item itself, only the way the items – the words or images – are presented.”

A modification, however, is a change that does alter what is being measured, he notes. “Take, for example, a math item where the original item presents a problem as a word problem and a student then has to transfer the words into a mathematical problem and solve it. If the item was changed by removing the words so the student can focus on the computational aspect of the problem that constitutes a change in what is being measured.”
Some of the work Dr. Russell and his organizations have done involving universal design and accessibility has impacted the decision-making process used to determine which modifications are appropriate. “Traditionally, for test accommodations, most states’ policies focused on a student’s Individual Education Plan (IEP) and whether or not a test accommodation is specified in that plan. Often those plans are based on the disability with which a student has been identified and which disability group that student is placed in.”

For a given disability group, he says, “it’s commonly accepted that certain types of accommodations help those students access, interact and respond to material. The traditional practice has been for an IEP team to look at a student’s IEP, examine whether or not accommodations are specified for that student and, if so, make a decision about whether or not for a given test that student should have that accommodation provided to them.”

**Consideration Based on Need**

Now, however, “we are beginning to see a movement away from an emphasis on identifying students with disabilities and then considering which accommodation might be appropriate for the disability and toward matching accommodations with students’ individual needs. This seems like a subtle shift, but it is really quite important. Rather than assuming that an accommodation is needed because a student is a member of a given disability group, we are starting to see educators focus on the needs of each student, regardless of their group membership, and matching tools and strategies to their specific needs.”

Some needs, he says, “arise because of disabilities that have been identified while others arise for reasons that are unrelated to an identified disability.” Even within a given disability, specific needs may vary by individuals, he points out. For example, he explains, “some students may have very low vision and are Braille readers, but they have partial sight. The types of accommodations they need might consist of accessing text through Braille, or a large magnification of graphics and images.”

Other students with the same low vision may be non-Braille readers. “Their needs require very large magnification of graphic images along with read-aloud text.” Still other students may be accustomed to using magnification software on their computers. “They may not need content read aloud. They may only need a tool that
will greatly enlarge the text. Some of those students may also benefit from reverse contrasts.” In that case, he advises, “enlarge and reverse the text so the students are able to access it.”

The idea, Dr. Russell says, is not to say, ‘You’re a low-vision student therefore members of this disability group are going to get ‘x,’ but instead to meet the specific need of a student regardless of the student’s disability. If that need can be met through an accommodation or an alternate way of accessing test content then the accommodation ought to be provided.” According to Dr. Russell, this shift in approach, while it does not represent a major conceptual change, “is a big shift in terms of the decision-making process.”

The new decision-making process starts, he says, with each student garnering a support group consisting of individuals who know that student best, including parents, a special educator, and the student’s teachers, “and determining what accommodations will enable the student to most effectively access information in the classroom and what will help the student to best demonstrate her knowledge and capabilities.”

**School Districts, Accommodations and Testing: Three Categories of Concern**

School districts share three categories of concern regarding accommodations, says Dr. Russell. The first category of concern, he explains, is student need identification. “When it comes to testing, schools are concerned about whether they have identified the needs of students.”

The second category of concern, he notes, is providing appropriate tools and resources to meet the identified needs. “Even today in any context, many schools recognize that they have large numbers of students who need a read-aloud accommodation. Ideally there would be one individual working with each student to provide the reading.” However, he adds, schools lack sufficient personnel to do this. “They lack enough quiet corners in the schools. The result is that there are small groups of students working with a single teacher.” Schools are in some cases concerned about their ability to meet the needs of students during an assessment, Dr. Russell concludes.
The third category of concern among school districts, particularly within the context of accountability and No Child Left Behind, is in implementing solutions that will invalidate students’ scores. “There is some wariness about providing assistance that might be viewed as helping students answer a question as opposed to helping them access a question. What links these three categories of concern is an overarching concern about equity and standardization the provision of accommodations.”

These concerns, he insists, can be addressed at the state testing program level by adopting policies and tools that remove the burden from schools for providing the resources needed to provide accommodations. Removing this burden, he asserts, will help standardize the provision of accommodations among schools and ensure that all schools can provide high-quality accommodations for all students. For example, “if schools can move to a computer-based delivery system that has accommodation and accessibility tools built into it then they will not have to provide human resources.” Concerns about standardization and equity are removed “because when schools adopt a computer-based delivery system everyone receives high quality, no matter what resources the school has available.”

Many schools have become exposed to universally designed computer-based delivery only in the past 18 months, Dr. Russell says. “There’s been talk about universal design in testing for many years, but there has not been a platform that embraces those principles until very recently.”

Some states, he notes, are attempting to determine how to make the transition to computer-based platforms. “Florida has conducted some pilot studies as has New Hampshire. Vermont, New Hampshire, and Rhode Island are using a computer-based platform for their 11th grade science test this year. Delaware’s most recent Request for Proposal contains language that effectively requires computer-based tools.” Despite a perceptible movement toward computer-based assessment it is not yet a nationwide trend, Dr. Russell says. “Most states are just now becoming aware that universally designed computer-based test delivery is an option.”

**Computer-Based Testing: Roadblocks Loom**
The good news, according to Dr. Russell, is that there is little
resistance from state testing programs to computer-based testing. “I’ve spoken about it to more than 30 states over the past 18 months. If there was an easy way to transition to it my guess is that every state would do so. The roadblocks are the current nationwide economic crisis and existing vendor contracts. There are some concerns about capacity of schools. But there is no philosophical resistance.”

One major issue, he notes is “whether or not these tools are limited to students with disabilities, which is the more traditional way of thinking about accommodations, or should the tools be made available to anyone who might benefit from them.”

In Dr. Russell’s opinion, “some states will move in the direction of computer-based platforms very quickly.” New Hampshire has effectively done that already, he notes. “New Hampshire has said that any student whose teachers or [counselors] believe that these tools will benefit the student during testing is eligible to use that tool without reference to his IEP. That’s a huge change, a big paradigm shift. It’s much like closed-captioning. When closed-captioning was first introduced, it was assumed that only those people who are deaf or hearing-impaired would benefit. However, today we see that many people who aren’t deaf or hearing-impaired make use of closed-captioning. The same will likely occur for many of the tools that are built into a universally designed test delivery system.”

One of the long-term benefits of these evolving tools and systems, he points out, is that they help identify disabilities that have been camouflaged. “I’ve often heard, ‘When we turn on the color contrast tool Johnny does a lot better.’ Based on this observation, an educator may discover that Johnny has a visual need or a stimulus processing disorder that had been undetected.”

**Universal Design Principles in Nimble Tools**

Dr. Russell and his NimbleTools co-developer Tom Hoffman have begun to incorporate universal design principles in several current projects. “We’re developing a computer-based test delivery system with accessibility tools built into it. We’ve been working on this for 5-6 years. The project started with reading. The State of New Hampshire asked us to explore the use of computers for read-aloud accommodations. We developed a prototype for that purpose. We found that every time we used one version with a
group of students, the students or their teachers end up making a suggestion about other needs that could be met.”

Universal design has achieved two major objectives, he notes. “First, it forces us to continuously think about students’ needs and how those needs differ among students. Second, getting this concept to work in a standardized manner in all schools and across all computer platforms, is like applying universal design principles to building architecture. In other words, we’ve been trying to incorporate accessibility features into the architecture of the system rather than adding on tools and features after the system has been developed.”

Rather than adding on, he explains, “we always return to the underlying architecture and determine how to build a specific tool into the architecture so that it works with all the other tools that are there.” Rather than layering on and finding external tools that may or may not be compatible, “we return to the basic architecture of the platform and make sure the tool is built in. Sometimes that means we have to undertake a complete redesign of the architecture.”

**Teachers Need Little Training, Only Time**

Teachers need very little training with the computer-based testing tools provided by NimbleTools, Dr. Russell asserts, only time. “What teachers need is time to work with students, as opposed to training. For many students these tools and the flexibility to use them as needed are relatively new.”

Teachers, he adds, “need to help students make informed choices about what will work well for them as opposed to what will be distracting. That means that teachers must become familiar with the tools. The design itself is universal in the sense that we want it to be as intuitive as possible for students to use. But time is required to understand the full range of options that are built into the system.”

In most cases, he continues, users can view a one-minute tutorial showing the use of the tool and then have a couple of the items with which to experiment. “In the vast majority of cases teachers will know how to use that tool. The key, though, is for teachers to have the time to work individually with students to make sure the students are making good choices.”
Surprisingly, Dr. Russell’s tools have so far encountered little resistance from teachers, even from veteran teachers who may have had limited prior exposure to technology-based approaches. “In all the schools we’ve worked with we have not encountered any resistance,” he says. “In fact, what we often hear from teachers is, ‘Wow, this is what we’ve always needed!’”

He cautions, however, that “we’re not asking teachers to put content into this system yet. We’re hoping next year to have a tool that will allow that. When we get to that stage we will start to see some teachers begin to require more support. Right now we’re just presenting assessment tasks and items on a computer for students. The teacher only needs to be there to help students make good choices. In most cases, the student is working directly with the interface as opposed to the teacher having to prepare content for students to work with. Teachers see the system and say, ‘I’ve always struggled with providing accommodations in a classroom but this is so easy.’”

**Parents Need to Know What’s Possible**

Parental input regarding accommodations issue varies from school to school and by grade level, Dr. Russell says. “Younger parents tend to be more involved in these decisions than parents of older students. What parents most need to know is what is possible. Many are unaware of what is possible today. Parents can’t ask for what they’re unaware of.”

For parents, he admits, awareness building can be challenging. “Resources for parents exist,” he states, “but unless parents are directed to those resources most are probably unaware of them. I recently received a call from a parent in Massachusetts whose child was preparing to take a standardized state test. The parent said, ‘I know my child has these needs. It sounds like what you’ve created can help her. What do I have to do to enable our child to use this tool?’” Once parents develop awareness, he says, “their next challenge is to persuade state testing programs to allow the use of some of these tools.”

With state testing programs, he continues, what is most important is what is included in a state’s RFP, or an invitation for proposals. “We’ve been trying to educate states about what’s possible and then help them to understand that if they want computer-based testing and accommodations they need to request them. Asking for them doesn’t mean just using the words ‘universal design.’ They need to be very specific
about what they mean by ‘universal design’ and what they want a universally
designed program to provide.”

Fortunately, he says, the horizon is brightening. “Delaware, a couple of months ago,
issued an RFP which is a perfect example of very concrete specifications. I predict
that we will see more RFPs like that one.”

The state testing programs are in a difficult position, he concedes. “They can’t ask for
something that can’t be delivered. Now that states are beginning to see what is
possible, my hope is that they will start asking for it specifically.”

For their part, he adds, “parents and other advocates can let the states know that,
yes, it is really important to be asking for this and if you ask for it you are likely to save
money in the long run because it is computer-based and is a universal approach to
solving challenges to providing accommodations. Pressure exerted by advocacy
groups on state programs will speed general acceptance.”

**Technological Tools that Provide Accommodations**

According to Dr. Russell, there are several existing technology-based tools that
provide accommodations and the promise of more to come. “There is potential for
electronic Braille displays to be used,” he says. “Some of the work we’ve done has
experimented with similar tools for low-vision students.” Successful experimentation,
he notes, “will increase access for blind and visually impaired students who read
Braille and will decrease costs.”

Integrating signing video into computer-based testing holds great promise for
increasing access to content for students who communicate in sign, he predicts. “It
also has the potential to increase engagement because with an avatar there is an
opportunity for students to have more control over the avatar itself, over what the
characteristics of the avatar look like or whether or not there is closed captioning,
whether there is sound associated with the signing or not.”

Computerized read-aloud text already exists, as does magnification, he
acknowledges. “We’ve worked on developing magnification tools designed for
students with different needs. Some of those are going to be common and can be
used by anyone. Some of those tools you wouldn’t want anyone else to use because they are designed to meet very specific needs.”

**For Test Accommodations, the Future May Be Past**

Dr. Russell hopes that the concept of test accommodations will be replaced by universal design and the flexibility that computer-based technology affords. “As the technologies improve over time they will achieve more and more acceptance for providing access. I believe that most assessment, whether large-scale or even classroom assessments, will move to a digital format. Once in a digital format some of these accessibility tools, whether built into a platform like NimbleTools or tools that are provided by other organizations, are going to become so common that we will stop thinking about them, like closed-captioning today.”

How quickly this vision takes shape is dependent on two factors, Dr. Russell says. One key is how fast states begin specifying universal design-type systems in their RFPs. The second key is the extent to which the assessment vendors, who are putting content into the classroom and also running large-scale programs, decide that it’s important to have a common interface across their product line.”

If the vendors make that decision relatively quickly and can change their products, he says, the transition to a new era might occur soon. “However, he cautions, if the big publishers are slower to adopt those changes, or if states are slower to change their RFPs, it could take as long as 10 years before a transition to digital assessment is complete.” However, if states and vendors work in tandem, he predicts, the transition could come within the next 3-5 years.