The State of Assistive Technology: Themes From an Outcomes Summit

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Abstract: This article presents findings from a December, 2005, national assistive technology (AT) Outcomes Summit attended by AT experts representing vendors, higher education, government, and public schools. Discussions conducted centered around three questions: (a) What are the current challenges with the use of technology and AT in assessment of educational outcomes? (b) How do these challenges affect the assessment of writing, reading, math, and other content areas? and (c) What is needed to measure the impact of AT on educational progress? Four overriding themes emerging from these discussions were identified, including (a) assessment, (b) evidence-based research in AT effectiveness, (c) professional preparation, and (d) technology generalization. Specific issues within each of these broad themes are discussed and supported by comments from participants. Outcomes and benefits are presented in the context of 'next steps' for the AT discipline.

Key Words: Assistive technology outcomes, Assistive technology issues, Statewide assessments, Differentiated assessment

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The State of Assistive Technology: Themes From an Outcomes Summit

The potential of AT to improve the lives of school-age children with disabilities has been widely acknowledged in the U.S. (Ashton, 2005; Edyburn, Higgins, & Boone, 2005; Peterson-Karlan & Parette, in press; Smith & Smith, 2004), and a broad array of AT devices and services is currently implemented in classrooms nationwide (Parette, 2006; Peterson-Karlan, Parette, & Wojcik, 2006).

Unfortunately, the field of AT is still in an infant state of development with regard to documenting the outcomes of AT service delivery (see e.g., Edyburn, 2005; Edyburn & Smith, 2004). Legislative mandates (i.e., The No Child Left Behind Act of 2002 [NCLB] and Individuals with Disabilities Education Improvement Act of 2004 [IDEIA 2004]) have placed emphasis on the participation of children with disabilities in the general education curriculum. NCLB, in particular, has resulted in tremendous pressure on public schools nationwide to ensure that all children progress and demonstrate achievement in the curriculum. Two nationally funded projects were initiated to develop outcomes monitoring strategies (Assistive Technology Outcomes Measurement System, 2005; Consortium for Assistive Technology Outcomes Research, n.d.), though, to date, little direction is available to education professionals regarding the documentation of AT outcomes (Parette, 2006). Numerous individuals have published reports regarding the role of AT in large scale assessments (cf. Clapper, Morse, Lazarus, Thompson, & Thurlow, 2003; Fletcher et al., 2006; Thurlow, Minnema, & Treat, 2004; Tyndal & Haladyna, 2002) yet guidelines are infrequently available to assist schools in creating systems and strategies for collecting data related to the effects of AT interventions on student progress (SEAT Center, National Center for Technology Innovation, and University of Kansas, 2005). Paralleling these events, researchers in the area of curriculum-based measurement have attempted to provide teachers with means for assessing continuous student progress in the classroom (Fuchs, Fuchs, & Hamlett, 2005). Given these simultaneous events, a current issue is how education professionals can determine the

Table 1
Themes Emerging from Summit Discussions

Theme	Issue
Assessment	Allowable technology on high-stakes assessment may be driving decision to implement tech in classroom – disallowed technologies are being disregarded even in the classroom
	Technology-supported performance is still viewed with suspicion as an academic assessment
	Technology-supported and differentiated assessment (universal design for assessment) should be a model
Evidenced-Based Research in AT Effectiveness	Need a research base demonstrating effectiveness of AT for student learning
	Need to identify common outcome measures related to achievement so that data sets can be aggregated
	Need to make better connections between R&D and research-to-practice
Professional Preparation	Trainings are often focused on technology operations, not on effective implementation
	New teachers may be "tech ready" but curricular materials, classrooms, and standards are not
Technology Generalization	Preparing students for the information technology world requires new thinking
	New technology tools require new skills for implementation
	AT is crossing into general education as instructional technology

role and effectiveness of AT; and perhaps more centrally is the question, "What is the model for determining the effect of AT on educational outcomes for students with high incidence disabilities?" (SEAT Center et al., 2005).

A Collaborative Summit Event to Examine Current Issues

In light of the plethora of AT issues currently impacting public education (Edyburn et al., 2005; Parette, Peterson-Karlan, & Wojcik, 2005; Wojcik et al., 2004), personnel of the Special Education Assistive Technology (SEAT) Center at Illinois State University, in partnership with the National Center for Technology Innovation and the Department of Special Education at the University of Kansas, and with sponsorship support from Ablenet, Inc., Don Johnston, Inc., Freedom Scientific Learning Systems Group, Illinois State University, Kurzweil Educational Systems, Inc., and Texthelp Systems, Inc., hosted an Assistive Technology Outcomes Summit in Chicago, Illinois, on December 15-16, 2005. Nationally recognized individuals representing vendors, research institutions, state projects, government, and school district practitioners were invited to participate. Conceptually, the Summit was designed to bring together a cadre of experts from both general and special education to clarify the inherent issues related to the effects of AT on educational outcomes. Targeted outcomes were to examine participant responses to a series of questions with the identification of strategies and recommendations that would serve as a framework for subsequent research, policy development, curricula, and professional development activities. Key questions presented to the Summit participants included the following: (a) What are the current challenges with the use of technology and AT in assessment of educational outcomes? (b) How do these challenges affect the assessment of writing, reading, math, and other content areas? and (c) What is needed to measure the impact of AT on educational progress? In addition to videotaped large group discussions, small group sessions were conducted by facilitators using flip charts, allowing for capture of key thoughts by participants. Transcriptions were made of both large group proceedings of the small group discussions and analyzed using traditional qualitative methodologies (Bogdan & Biklen, 1998; Leedy & Ormrod, 2001; McMillan & Wergin, 2002). Four main themes that emerged included: (a) assessment, (b) evidence-based research in AT effectiveness, (c) professional preparation, and (d) technology generalization (See Table 1). Analyses of themes emerging from each of these areas of discussion are presented in the following sections.

Assessment

Allowable technology may be driving decisions to implement technology in classrooms. Considerable discussion focused on the issue of high stakes assessment practices across states and the role of AT in those practices. Special emphasis was placed on technology as an accommodation issue. Participants observed that current statewide assessment practices, especially accommodations allowed for testing, drives consideration of research on technology use in content areas. Since limitations are placed on the use of AT in testing practices, students have a diminished ability to demonstrate their proficiency in content areas.

As noted by Martha Thurlow, Director of the National Center for Education Outcomes, there are many issues embedded in the practice of providing accommodations that "have policy associated with them which means they are considered okay or not okay." With the associated costs of providing accommodations, and the statewide assessments themselves, resource constraints

are being realized by schools. Denise DeCoste, Technology Consultant with the Montgomery Public Schools, observed:

> It is interesting that because of No Child Left Behind and the emphasis on standardized testing, our districts actually have fewer computers per classroom now because all of those computers are going to labs in order to do the high-stakes testing.

This position was supported by Dave Edyburn, Co-Director of the Assistive Technology Outcomes Measurement System (ATOMS) Project, who commented, "When you put all of the dollars into the assessment, there are no dollars for intervention." However, until there is credible evidence regarding the relationship between AT use and enhanced classroom performance, statewide assessment practices will be driving decisions to use AT in classrooms. This prompted a response by George Peterson-Karlan, Illinois State University:

> Are we waiting for the technology to be allowable on the tests before we make a big push to put that technology in the classroom?...are we waiting for that or should we be thinking about increasing the technology tools in the classroom and having a way to figure out whether the students are doing better. Then if they don't do better on the tests as the tests are now constructed--given a good body of data about their performance in the classroom--then we point to more of a discrepancy with the testing.

Technology-supported performance viewed with suspicion. Of particular concern to participants was the observation that many education professionals continue to view technology as a support for students to participate and make progress in the curriculum. Current standards in the content areas are technologically insufficient. These standards must be met and exceeded by 21st century skills and National Education Technology Standards (NETS; International Society for Technology in Education NETS Project, 2000-2005) which will require an expansion of standards to embrace 21st century skills (Peterson-Karlan & Parette, in press) and NETS. It is important that standards be expanded to 'free' the tool to meet the standard and that all education professionals recognize that new tools are not "cheating."

Equity issues related to statewide testing and AT surfaced repeatedly during discussions. A poignant point was made by Dave Edyburn who commented:

> We are in a situation right now where we have conflicting laws that we have to provide assistive technology. So if there is an academic performance problem, that is by definition the need for assistive technology and yet what we are doing is we are setting this up in the traditional amount of education that it only counts if it's here and we're not looking at the interaction between the person and a tool because that's cheating, that's less performance…When they re-roof your house, they are all using nail guns and yet in school they call it cheating [*if AT is used*, emphasis added].

Unfortunately, biases and misconceptions of teachers regarding the fairness of using AT have a profound impact on whether students learn to advocate for their own technology needed. As Cindy Okolo, of Michigan State University, noted:

> …teachers are a bit paranoid about assistive technology and perhaps the unfair advantage it gives kids and that makes kids kind of paranoid. So, my

> daughter is not going to be a strong advocate for the use of technology in her classroom because her teachers, you know, are not sure about this and they are not sure if it is fair to let her have this sort of advantage as a seventh grader.

Technology supported and differentiated assessment (universal design for assessment) should be a model. The nuances of current statewide assessment practices have resulted in insensitivity to individualization. More specifically, the notion that 'everyone must pass' inherent in NCLB seems to be driving non-individualized implementation of assessment approaches in the states. This problem was clearly summarized by Dave Edyburn:

> Because failing is not an option…we've used a metaphor--the assembly line. We want to control the input. Let me control the curriculum, let me control that processing, that highly qualified teacher, and then my outcome measure is no defects. Everybody is ready to run. So you see here is I think one of the issues we are struggling with--the lack of tolerance for individualization. The assembly line model does not represent what learning is about. When you apply that, what you've got is a one-size-fits-all to meet no one's needs.

Passage of the IDEIA 2004 has resulted in changes in our ideas around learning and cognitive disabilities and the concept of a pre-identification strategy known as 'response to intervention' (RTI; Fuchs, Mock, Morgan, & Young, 2003; Gresham, 2002). The emphasis of RTI focuses on the delivery of more effective instruction by encouraging earlier intervention for students experiencing reading and related learning difficulties. Identification of students as having learning and cognitive disabilities then would be minimized since intervention is provided as academic concerns emerge. Since AT can increase the participation of students with disabilities in the general education curriculum (Edyburn, 2005; Peterson-Karlan & Parette, in press), and minimize the performance deficits resulting from disability (Cook & Hussey, 2002), the RTI model holds promise for the AT field.

Support for developing and implementing technology-differentiated statewide assessment practices was repeatedly expressed by participants. Such strategies would be complemented by *dynamic norming* (Edyburn & Smith, 2004) which involves the extraction of data in a real-time database to make comparative norm groups. Thus, in essence, technology-supported assessment could be equated with universal design for assessment (Dolan, 2000; Ketterlin-Geller, 2005).

Evidenced-Based Research in AT Effectiveness

Need for research base demonstrating effectiveness of AT for student learning. Echoing previous findings of national need (SEAT Center, 2004), discussants found that there is a persistent need for a national database of AT outcomes. Participants identified a need for a research base demonstrating the effect of AT on student learning. As noted by Jane Lurquin, Illinois Department of Education, there is a "need for research and having a national database or a common way that we can actually have and share research on the effectiveness of technology and that takes a long time to gather." With regard to statewide assessment practices, participants voiced needs for instructional as well as 'norm-referenced data.' This can be accomplished using such strategies as concurrent time series designs (Parette, 2005; Peterson-Karlan, Wojcik, & Parette, 2006) where multiple scores are attained using AT-assisted and non-assisted performance measures.

The current status was succinctly summarized by Caroline Van Howe when noting what Intellitools, Inc., encounters when working with schools across the country:

> All of the teachers that we speak to in the school districts…are being held to looking for data-driven decision making processes, so they're looking to vendors to provide that information that the data is out there to prove that this technology or this intervention strategy has been successful…there isn't a general national database of research that can prove this or that product or intervention.

However, developing such a database is fraught with problems. Outcomes of interest have yet to be clearly identified across the country (SEAT Center, 2004). This recognition was mentioned by Gayl Bowser, Oregon Assistive Technology Project, who observed, "I am always struck that one of the things I think we haven't yet done well is to really define what the outcomes we are talking about are." One of the most important outcomes of public education is graduation, though as Cindy Okolo commented, "that in all of the concern about more rigorous graduation requirements, people really don't think about assistive technology as a way to help kids achieve those requirements." Related to this issue was the concern regarding needs for information and professional development. Gayl Bowser stated that there is a need for professionals in the AT discipline to "figure out what we need to say to general education teachers about the technology they are using in their classrooms for instruction." However, in order to do this, there is a need to differentiate the contributions of various facets of instruction (e.g., technology, differentiated instruction, teacher quality) to understand 'cause' and communicate this to general education teachers. As observed by Ted Hasselbring, University of Kentucky:

> One of the problems we have is teasing out what really made the difference? Was it the actual technology because everything is taking place simultaneously. Was it the technology, they use that. We had good, good instruction, differentiated instruction and was it really that? Was it that the kids, you know….it could be a lot of factors. Do they feel really safe? Is this a great teacher where they feel the teacher cares about them, they can take risks, they can learn better?

Compounding the development of evidence-based research is the *technology implementation paradox*. That is, teachers and administrators are hesitant to implement AT in the absence of proof, though desired proof of effectiveness cannot be achieved without implementation. But as Don Johnston, founder of Don Johnston, Inc., suggested,

> …we should identify the fundamental thing that we're measuring and now let's apply some technology…let's put some money to that and say, "What does this solution cost and now lets put a research piece into this and now measure the fundamental thing."…We should all be doing that as part of everyday implementation.

Participants expressed concern that the 'features wars' (Burger, 2002; McFarlane, 2004), i.e., competition among vendors to develop complex devices with many features, has now culminated in a recognition that the AT field give consideration to 'proving' the features of technology. This need does not embrace a focus on the tool as a whole, but rather on critical elements of ecologically valid tasks, i.e., real world applications (Wehmeyer, Smith, & Davies, 2005). The research that is

being conducted should include matching the features of technology to the elements of instruction in the same way that we are matching features of the technology to elements of the task.

At both the classroom and district level, evidence-based practice and its documentation was integrally linked to time, i.e., there has, to date, been little time to conduct research both on implementation and effectiveness of AT. Compounding this issue is lack of equity across schools with regard to available technology resources.

Need to identify common achievement outcome measures so that data sets can be aggregated. Participants identified two 'realities' that characterize current practices. First, little information is available, much less agreement on, important outcomes to measure AT effectiveness. Second, access to AT tools during assessment processes continues to be limited.

Specific needs for identifying common achievement measures were identified by participants. The context for this need was articulated by Dave Edyburn, who noted:

> …you have kids with disabilities and you leave school. The achievement gap is based on data. Current practices are not effective for all students. There is 50 years of data that says what we do doesn't work for some groups of kids so we do that and then next Monday I go on and you'd fail. That is what education is. We have been disenfranchising kids. Now, with No Child Left Behind, we have instituted another model here and let me have you guess the metaphor…is that on Monday I'm going to use state standards and benchmarks and that will tell you what you guys are going to learn this week. Then Tuesday through Thursday because I am highly qualified, I will do researched-based interventions all week and then on Friday we will do a quiz or a high-stakes assessment and then because of No Child Left Behind, you all pass.

Discussants noted that we must question the fundamental outcomes of education, i.e., what is the 'base level of technology' needed to do the research? As Don Johnston suggested,

> I think we need to design the outcome of what is the fundamental thing that you want to measure for success, so what's our ultimate goal with our students and how do we measure what that is? We get so caught up in let's measure spelling as a way to look at expression and it's not a good…it's not the fundamental thing that we're really measuring.

There was an acknowledgment that critical outcomes may be discrepant from instructional outcomes, and that educational outcomes/standards may be discrepant from critical life competencies.

Need to make better connections between research and development and research to practice. Current federal legislation and resultant trends in education emphasize the ongoing needs for translation of AT research findings, especially with regard to AT outcomes and benefits, into practice recommendations (Edyburn, et.al., 2005; Fuhrer, 2001; Lenker & Paquet, 200). Participants involved in research and development noted specific challenges with regard to AT and content areas. Jeff Higginbotham, University at Buffalo, observed that professionals should

> …make sure that we have a close and closer relationship between research and development of these technologies so that there is a research

> base to the…not that the technology works but that the technology fits the person that it is supposed to be working for.

Discussants also noted that content areas are not in the same research level and maturity with relation to the curriculum and related curriculum measures. In the discussions regarding math, for example, it would appear that this discipline is much more mature in its approach to curriculum and standards (vs. reading and writing where less consensus may be found). Widespread dissemination of research to practice strategies is also a recurrent need articulated by the field.

Not surprisingly, the lack of direction in the field regarding effective AT practices and documentation of outcomes raises questions regarding how to communicate with government and other decision-making entities. David Richmond, who is responsible for Constituent Relations for the 14th District of Illinois, provided insights for consideration:

> From a government standpoint…People always want to know where to go and what to do. I have always said is look at who has the authority. We talk about cost benefit analysis. Teachers answer to administrators, administrators right now are answering for the test scores of their schools to the states, and the states are answering to the No Child Left Behind and the federal government. Nobody wants to be labeled as a failing school. In turn, when those things happen and segments of their population are not meeting yearly annual progress and are being labeled that, then administrators say, "What can we do?" At that point, I believe you see administrators starting to say, "Is there some assistive technology out there?" The federal government No Child Left Behind, they want to see the benefit, they want to see the test scores, they want to see the children educated. The administrators--they want to see what it costs. The teachers and parents, who we've kind of left out of a lot of the equation, they a lot of times don't know where to go and what's available so I think it's important that we look at the cost benefit and I think in the future…

When queried further by Tracy Gray, National Center for Technology Innovation, who asked, "Could you just give us a consensus statement of what your perspective is as somebody working with a policymaker, what that research might look like?" David replied,

> When you're able to show, you know in the basic form, 'X' amount of dollars equals better students. 'X' amount of dollars creates assistive technology which creates better students for testing. Those are kind of the links that as a public policy looks at, you know whether it goes this way or this way, they all have to meet.

Professional Preparation

The importance of professional development of education professionals to effectively provide AT services has been frequently cited in the literature (Ashton, 2004; Ludlow, 2001; McGregor & Pachuski, 1996; Peterson-Karlan & Parette, in press; SEAT Center, 2004; Smith & Allsopp, 2005; Wojcik, Peterson-Karlan, Watts, & Parette, 2004). Continuing conversations regarding the AT consideration process (Center for Technology in Education, Johns Hopkins University; and Technology & Media Division [TAM] of the Council for Exceptional Children, 2005; Reed & Bowser, 2005; Zabala & Carl, 2005) and the ability of

education professionals to effective 'consider' AT has yet to be realized in effective practices nationally. Despite meaningful dialogue, presentations in a plethora of professional venues, and scholarly publications, AT consideration remains a poorly implemented process in many school systems. All too often, a "failure criterion" is utilized, i.e., students with disabilities are allowed to demonstrate poor performance in academic areas before technology is even considered, much less implemented with these students.

In the U.S. the status of current teacher preparation efforts to address such problems was succinctly summarized by Cindy Okolo:

> I think we're doing a really lousy job with pre-service teachers and any kind of impact we can have or anybody else can have on pre-service teacher preparation--ways of making information more readily available to people who are teaching are teachers, so they can get this into pre-service classes…is really important.

Participants agreed that major changes are necessary in teacher education practices, although it was noted that negative attitudes towards technology remains a barrier to such changes. The challenge presented by existing attitudes was summarized by Don Johnston:

> I think proven results would be an amazing, powerful influence but it's more than that. I think there is an insidious, negative attitude toward technology because it takes a system that hasn't changed for 150 years and forces it to change fundamentally…So give me attitude….give me a change of attitude and I think that everything else will be the lags and will fall into place.

Attitude changes at the school level were also deemed to be a substantive area of challenge for the discipline. Denise Decoste commented that "….the thing that's important I think in professional development is an attitude shift, is a paradigm change for teachers--they have to think differently about planning their curriculum and they need curriculum support to do that." Jane Lurquin observed that:

> Curriculum does need to have the assistive technology built into it and also staff attitude has to be changed. That has to start with administration and superintendents because if they're not into, really into assistive tech, they're not going to get it into the schools.

Trainings focused on technology operations vs. effective implementation. Professional development has typically focused on 'basics of operation' vs. implementation of technology. As observed by Denise DeCoste:

> Even though we do lots and lots of training, I think training has to go beyond the software basics and move into implementation. Unless we teach teachers how to use the technology effectively, what are we collecting data on?

Disconnect between technology readiness of teachers and curricula, classrooms, and standards. The issue of standards also surfaced in discussions, and it was acknowledged that today's standards were socially validated for yesterday's needs. Sean Smith, University of Kansas, observed that:

> …some of the things that we would be instructing or the standards that we are trying to address may not be the really critical standards that we need to address for that transition to work and

> that really what we need for life competencies.

Resulting outcomes should be validated outcomes against 21st century skills given that new teachers--typically those from the Millennial or Net generations—are ready and willing to use new and emerging technologies. As observed by Denise DeCoste,

> …we have lots of new teachers that come into the district who are tech ready. They grew up with technology…, but then they enter a system where the curriculum is highly scripted and there is no reference to how to use technology as part of their curriculum. In addition…, there is no communicated expectations necessarily for that.

However, curricula in institutions of higher learning are not yet sufficiently organized and delivered to allow these future teachers to use the technologies for learning that are so readily available. This has an impact on subsequent teacher practices, as expressed by John Castellani, Johns Hopkins University:

> We've seen that In Maryland where we are trying to talk to teachers about 21st century skills and then you go back to the Maryland curriculum and start looking for where things like inventive thinking, problem solving, a lot of just the outcomes that you'd expect out of good technology integration. You can find it in elementary school, you can't find it hardly at all in middle school, and in high school it's nonexistent. It's an issue and teachers are to the point in some counties where their lessons are even scripted, at 9:09 this is what you are saying to a child, at 9:15 this is what you are doing, and in the last 10 minutes you are sustaining silent reading. You know, and that's the reality so the creativeness about integrating technology unless it is on an IEP where you say I have to do this and then you give that to the teacher for him or her to decide then how that fits into what they're doing with their IEP and then how the IEP fits into the state standardized curriculum and how, you know what their tests do to support or what their assessments look like.

Practitioners in the field also repeatedly lament the cost of inherent tools that are available to assist students with disabilities to participate effectively in the curriculum. As noted by George Peterson-Karlan:

> In some subjects, in this case math, there appear to be inherent tools, e.g., calculators, the other one brought up is the graphing calculator, that have been identified by content experts like NCTM (National Council of Teachers of Mathematics, emphasis added) and parents are actually providing these tools as part of the curriculum so it became obvious from looking at the other charts that we don't have the same inherent tools in writing and reading that have been labeled, that have been identified by national content experts.

Technology Generalization

Preparing students for the information technology world requires new thinking. Given that our Information Age society demands skill sets that public schools may not be developing in children with disabilities (Peterson-Karlan & Parette, in press; Peterson-Karlan & Parette, 2005), discussants reiterated that a discrepancy exists between schools and rest of world. In addressing the concern that there is a fundamental issue of preparing students for

participation in an Information Age society, Don Johnston stated:

> Has anyone not used a spellchecker in the last week? I mean, so we want to put our energy to figuring out that every kid should be using a spellchecker and you know even as a business, the people who turn in their papers to me or some type of work with spelling errors, that's the problem. I don't care how they got something to me but if I have an employee….if I have an employee who is doing stuff, I don't care if they used a spellchecker or not.

From the professional development perspective, George Peterson-Karlan observed that undergraduates who receive AT professional development experiences

…are tech ready, they are tool users, but when they go out to the schools, the don't see those tools there. The students that are in middle schools are tech users and tool ready. So, as we keep talking about this, it is rather clear that the technology environment of the school doesn't match the rest of the world.

New technology tools require new skills for implementation. Compounding the problem is the challenge of developing new skills among new teachers for AT usage. As noted by Margaret Bausch, University of Kentucky:

> It seems to me that teachers are not coming out with the skill sets that they need to implement that technology. That seems to be something that we still need to address. Then if they have the technology and they know about the technology, then they can plan for that implementation of technology, whether it's assistive technology or instructional technology. Making that part of their planning process is planning…

Outcomes and Benefits: Next Step Themes

At the conclusion of the Outcomes Summit, participants were allowed the opportunity to identify three major issues they felt were critical for 'next steps' by the field. A total of five themes were identified (see Table 2). The following section presents a discussion of these themes.

Technology Integration

Although participants acknowledged the importance of professional development to create the broad AT skill sets necessary to more effectively provide AT services, it was

Table 2
Summary of Next Steps Themes

Theme	Issue
Technology Integration	Need to prove relationship between professional development and technology integration
	AT tipping point: Redefine AT as instructional or productivity tools
AT Outcomes Research	Need to connect researchers to school district data sets
AT Outcomes	Develop AT differentiated classroom outcomes protocols for research
Statewide Assessment	Technology differentiated assessments
Technology Generalization	General education market for AT tools

noted that there is still a need to prove that there is a relationship between professional development and technology integration, i.e., if people receive professional development, does it in turn result in more effective use of AT in classroom settings?

One issue that emerged that is of particular interest was an acknowledgment that the field of AT is at a 'tipping point.' This was summarized cogently by Denise DeCoste:

> I would say curriculum is actually is because we provide, for example in the real world, we provide lots of professional development and we can't get people to show up for this professional development. AT has crossed the tipping point. It's not as sexy as it used to be, it's not as seductive as it used to be, and quite frankly it's one more thing I've got to worry about as a teacher. Teachers tell us that.

But related to this was the recognition that AT should be redefined as instructional or productivity tools given current trends and issues related to statewide assessment and the emphasis on student achievement mandated by NCLB.

AT Outcomes Research

A key concern that permeated discussions was the need to both involve teachers in developing local data sets and connecting researchers to school district data sets. Caroline Van Howe stated the need for

> …action research…working with individual school districts on short six month projects to implement with them, according to their criteria, in a sustained implemental fashion and see what the benefits are from those short action research and then write up those studies, doing independently.

However, as observed by Tracy Gray, this cannot be accomplished without partnerships with higher education:

> In school districts there is a lot of data being collected but there's nobody there to help the schools or the state to look at what they're sitting on--trying to figure out some innovative way to connect universities, graduate schools, to get access to that data to see if there isn't some way to have more information coming out of the pipeline

AT Outcomes

Repeated conversations regarding assessment practices and current needs in the field clearly suggested the need to develop AT-differentiated classroom outcomes protocols for research. Such protocols hold the potential to provide comparable measures and scores using different levels of technology support for students with disabilities.

Statewide Assessment

Participants recognized the importance of statewide assessments and how they (a) determine initiatives state and individual districts have established, (b) dictate what building leaders note as primary objectives, and (c) determine what classroom teachers do on a day-to-day basis. Several panelists shared concerns about statewide assessments and the limitations these instruments offer students with disabilities, especially when restricting the use of technology-based supports used in a student's learning. During the course of this conversation several issues were presented and experiences shared concerning statewide assessments and technology access as an accommodation.

For example, Martha Thurlow offered recommendations to expand our understanding of AT as it relates to learning and specifically to testing. If we have data to share, we could further technology use within the statewide testing experience. Martha offered:

> … we could pull together research that has been done, even if it has not been published and try to begin to gather some of the evidence that is out there that may not be published out there and begin to try to gather a base of evidence that way…a set of policies related to assistive technology or technology, and we can go back in and dig that information out…I think that you need to get together other stakeholders, state policy people who are dealing with the test policies, test developers, and have this kind of discussion with them.

While there is a great deal of research to be done, anecdotal evidence suggests that technology-based supports can be instrumental in improving access to and success in state assessment experiences. For example, Ted Hasselbring offered comments concerning the State of Kentucky and their experience in providing screen reader technology to all learners for instructional as well as assessment experiences. Kentucky's experience suggests an increased independence on the part of the learner and an engagement in their own learning:

> Many of you know that the state of Kentucky has pushed very hard on this. They have made screen reader technology--I think through TextHelp--available to every school system in the state. Some of the anecdotal data….and these were for kids that...for example they had on their IEP the need for a human reader. They could supplant that with the screened reader and a lot of kids have. But the anecdotal data right now from these kids both in their classroom work and on the state test because some of these kids use a screened reader on the state test in lieu of a human reader, I would say 99% of the feedback is that they would much rather use the screen reader than the human reader and there are lots of different reasons for that. I think they are feeling good about it, about being able to use this; it frees them up. I don't think it is as much of a stigma for in-class work and tests when they have more control over what they are doing.

Other panelists agreed that technology-based solutions are offering increased supports that should be integrated into statewide assessments. The thought being that classrooms are differentiating instruction to further meaningful access to the curriculum and so, extending this concept to assessment is logical and appropriate. Joan Cunningham, of Kurzweil Educational Systems, Inc., shared her recent attendance at national conference where technology-based accommodations were being discussed.

> One of the things that came out at Large Scale Assessment Conference and a couple of the sessions that I was in this summer, was that accommodations actually ought to be by item so that…and kids could turn it on, turn it off, depending on what their needs were.

Discussion also focused on whether we assess in a manner appropriate to real-world application. That is, some participants voiced concerns over not permitting technology-based accommodations that these students would have access to and be expected to use

in real-world settings. If they are expected to use a software or hardware device in post-secondary experiences, why then do we restrict this device use in testing situation? Don Johnston best captured this when he commented:

> You know, wouldn't it be cool if that mechanic that uses that diagnostic technology is truly better than the one that doesn't have the diagnostic technology. Wouldn't that be a statement for everybody in our school system and a fundamental change, not for just our struggling students but a fundamental thing for everybody.

He followed with:

> We're putting our energy towards…is this an unfair advantage. The issue is, we should let everyone use this technology and then it wouldn't really matter. If our students are smart enough to know what tools they need, more power to them and then they're going to be successful as adults.

A number of participants favored further exploration into ways technology can be used as an accommodation or an essential part of the testing experience, similarly, others shared thoughts about the components of the assessment experience. For example, Charles "Skip" MacArthur noted that assessments seek to measure not only knowledge but fluency:

> We talk about extended time as an accommodation on the test but time is a relevant factor. Fluency and speed which you can do things is not an irrelevant factor for performance in the real world.

While discussion continued on technology differentiated state assessments, conclusions appear to favor further examination and collaboration amongst educators, vendors, policy makers, and test developers. Without these ongoing discussions, technology as an integral part of the assessment, and many argued instruction (since instruction is focused on NCLB-directed statewide assessments), would continue to be considered as a supplementary tool not available to all students and restricted to components of the testing.

Technology Generalization

As statewide assessment continues to dictate classroom instruction, participants voiced a need to enhance the use of AT in the general education classroom. To do so, AT must be viewed as a tool for the general education market. Tom Freeman, of Freedom Scientific, explained that as a vendor they are attempting to cross over to the general education classroom and tying this via statewide assessment supports. He explained:

> Obviously, we would like for what we have viewed as an assistive technology market to grow into general education, and we feel like the tools that our technologies offer really are appropriate for more than just to the special ed market. We're trying to figure out a way to get there and it's very difficult to get them there but we'll continue to try those things. Another thing from a testing perspective and I guess from a perspective of research, we're always interested in doing research. We've got a couple of situations. One, I mentioned to John last night in South Dakota, where they actually used one of our products for state testing and experienced good results that has fed back into the classroom and they're actually increasing their use of our products in the classroom which I

> view as very positive. We're going to keep on top of those types of things and make them available to others so that we know the results.

A key point made by a number of participants was that AT is effective beyond a targeted disability population. Caroline Van Howe shared:

> I know that in fact the effects from technology can be a great equalizer, just anecdotal information but not statistical. On a project with a school actually in Chicago, one of the byproducts of actually implementing the intelligence technology for a six-month period was that it was across all children in all the classes so it was full inclusion. The children with learning disabilities actually had a private relationship with the software in their computer, so they were actually assuming the same appearance as everybody else in the class. They found it to be a great equalizer. The success rate went up, their social confidence went up, they were much more positive about learning, they looked forward to lessons so it had a whole different experience for them having the technology being delivered to them, served up privately and discretely as software can do so it wasn't as transparent as the other way.

However, simply having effective technology is not the deciding factor for successful integration. As participants have already reported, application is multidimensional and involves a variety of factors. Still, participants shared ideas related to infusing these tools into the general education market. For example, Carol Leffler, of School District 54, Schaumburg, Illinois, offered:

> …we keep talking about integration of technology but we don't have a lot of good examples out there. I don't think teachers really even know what that looks like. So maybe some really good models and some videotaped models that teachers can see so they can kind of model it because you don't see it everywhere and people don't even know what it looks like.

Cindy Okolo agreed but also felt that part of the solution concerned information dissemination:

> I think to some extent some sort of clearinghouse, some sort of way to make this information more broadly available to teachers about…and again I'm looking from the perspective of instructional technology, technology being used to facilitate high-quality instruction in ways that will help a diverse classroom.

The issue of cost also became a critical concern. If we are to access the general education market, it was felt we need to address cost benefit issues. Don Johnston shared:

> The biggest thing is cost savings. I think that's part of the paradox to be added to it is that it's expensive to implement technology in school systems that with $400 laptops, $500 laptops, whatever they are, that's just a laptop. You know, the core stuff I don't think is that expensive compared to…we could provide individual instruction by providing teaching resources. We don't have enough teachers trained for that and so what is the role? I think it's more of an attitude.

David Richmond agreed, offering the earlier-noted perspective from policy-makers and district and building leadership, i.e., that there is a need to demonstrate that government commitments of funding equates with better technology and students.

Closing Thoughts

The application of AT into the lives of individuals with disabilities can be of great benefit and expand placement, educational, and overall developmental options for individuals with disabilities, their families, and the professionals that provide supports to them. Participants at this AT Outcomes Summit shared a number of thoughts concerning AT and its impact on an individual's development and the outcomes that have been and should continue to be measured in instructional areas. However, participants agreed that we have a great deal of work ahead of us as a profession if we seek to integrate AT into meaningful instruction/assessment and to truly understand the outcomes of these applications.

Part of that work involves enhancing the integration of AT into the lives of students with disabilities whether it be via (a) standards-based curricula and accommodations in statewide assessments, or (b) through the extension of evidence-based practices that show the effectiveness of AT in improving student learning. Consensus from the Summit focused on building/extending upon what we know about AT and its use with students with disabilities. As a field, we need to confront misinformation on the effectiveness of AT via further research. Likewise, we need to educate professionals on the impact of these applications and to confront biases and misconceptions that use of AT presents 'unfair' advantages.

Educating professionals, a frequently cited need prior to this Summit, was further reinforced and contextualized within the discussion of research. Thus, as we learn more on outcomes we need to share and offer illustrations of what is possible to teachers and other professionals. While the "how to" or operations of a particular application will continue to be important, Summit participants ask that we extend and improve the connection between curriculum and technology.

Finally, in this standards-based environment and what statewide assessments mean to educational funding, we cannot ignore the issue of cost-benefit if we are to enhance AT integration. It is not simply an issue of 'building and they will use' but rather one of 'developing and seeking to integrate solutions that enhance learning in a manner more effective than traditional means yet sensitive to finite resources.' Thus, as a field we need to further our understanding on AT outcomes, improve upon the dissemination of this information to key users, and do so in a cost-effective manner.

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