Accessing and Utilizing Technology in Alternate Assessments

Debra W. Moore
University of Pittsburgh

Mary A. Hansen
Robert Morris University

Peter Heh
California University of Pennsylvania

This paper summarizes data from an alternate assessment based on alternate achievement standards where teachers could administer the assessment via paper-and-pencil or electronically. The vast majority of teachers reported having access to technologies, training, and capabilities to utilize the digital system. Most reported no issues with electronic test delivery. Additionally, the majority of teachers reported that the majority of their students with significant intellectual disabilities can independently engage with technology, while a small proportion cannot meaningfully access electronic devices. Results both informed the assessment and provide general information about teachers' perceptions of their students' interactions and readiness with technology.

Keywords: alternate assessments, intellectual disabilities, technology, special education, teacher perceptions, digital literacy

INTRODUCTION

Legislation has driven many educational programs and decisions in the United States, including policies and practices related to individuals with physical and intellectual disabilities. As recently as 1967, almost 200,000 people with severe intellectual disabilities lived in state institutions (U.S. Department of Education, 1997). Additionally, in the early 1970s, a congressional investigation found that more than half of the eight million children with disabilities in the United States were not receiving an appropriate education (Jones, 1995). These and similar statistics prompted the development and passing of legislation to improve the quality of elementary and secondary education for all students, including students with disabilities.

Landmark legislation that greatly impacted students with disabilities includes the Elementary and Secondary Education Act (Elementary and Secondary Education Act [ESEA], 1965), which when reauthorized as the No Child Left Behind Act (No Child Left Behind [NCLB], 2001), required students with significant intellectual disabilities to be included in the statewide accountability system. Under NCLB, states were permitted to develop and administer alternate assessments based on alternate achievement standards to students with severe intellectual disabilities, which in practice has compiled

from less than 1% to approximately 2.4% of the tested population of K-12 students in various states (Wu, Thurlow, Albus, & Liu, 2020). By holding schools accountable to measure and track progress, NCLB increased the focus of instruction and assessment on students with disabilities, including students with severe intellectual disabilities. The latest of iteration of the law, the Every Student Succeeds Act (Every Student Succeeds Act (ESSA), 2015) continues to mandate high quality instruction and assessment of students with disabilities.

Alternate assessments based on alternate achievement standards (AA-AAS) are designed for and administered to students with significant intellectual disabilities in elementary, junior high, and high schools in the United States as part of the accountability system in K-12 education. The students who are administered AA-AAS cannot meaningfully participate in the general education assessment, even with accommodations. The assessments are aligned with alternate content standards, which are linked to grade level standards, but may be reduced in depth, breadth, or complexity from the general education standards. While relatively small percentages of students are administered AA-AAS, the population of students remains quite diverse. Students who participate in alternate assessments have a variety of diagnoses, including intellectual disability, multiple disabilities, and autism; and various abilities, including students who can engage in only receptive communication, as well as those who engage in expressive communication.

Landmark legislation for individuals with disabilities also included the Education for All Handicapped Children Act (EHA) (1975), later reauthorized as the Individuals with Disabilities Education Act (IDEA, 1990, 1997) and the Individuals with Disabilities Education Improvement Act (IDEIA, 2004). IDEA mandated that all students need access to the general education curriculum and academic standards and need to make progress towards proficiency of those standards (Roach & Elliot, 2006). IDEA required individualized education programs (IEPs) that address intentional supports for students, including services, supplementary aids, and accommodations-necessary to enhance their progress in the general education curricula (Pugach & Warger, 2001).

The reauthorization of IDEIA also mandates equal access to education for children with physical and intellectual disabilities, and ensures children's rights to a free appropriate public education in the least restrictive environment. IDEIA further requires IEPs to include "appropriate measurable postsecondary goals based on age-appropriate transition assessments related to training, education, employment, and, where appropriate, independent living skills" (§300.320(b)). Together, these laws have impacted the education and educational opportunities for students with disabilities, including students with significant intellectual disabilities.

Historically, prior to recent iterations of these landmark legislative acts, students with significant intellectual disabilities were mainly institutionalized, and when students were taught in public schools, they were taught a functional, rather than academic curriculum (Pugach & Warger, 2001). Debates over whether functional, academic or some combination of these curricula should be taught to students with significant intellectual disabilities remain under way (Bouck, 2012). However, as expectations for students with significant intellectual disabilities increase, the definition of functional curricula has expanded, and views about students' abilities to learn academic content continue to expand (Cihak, Wright, McMahon, Smith, & Kraiss, 2015). For example, Cihak, et al. (2015) address the importance of learning digital literacy skills for students with intellectual disabilities in order to function independently.

The use of technologies including assistive technologies has long been advocated for students with significant intellectual disabilities to support both learning of academic content and learning life skills (Wehmeyer, Palmer, Smith, Davies, & Stock, 2008). "Technology provides students with ID [intellectual disabilities] with numerous opportunities to access information that they may not have been able to obtain otherwise" (Cihak, et al., 2015, p. 156). Yet, Donne and Hansen (2017) found students' with disabilities access to assistive technologies remained limited, as did teachers' use of assistive technologies with their students.

Nonetheless, the shift to a digitally-dominated society requires that teachers prepare students for engagement and digital interaction, and incorporate digital literacy into their instruction (Bawden, 2008,

Cihak, et al., 2015). For all students including students with significant intellectual disabilities, digital literacy seems necessary for independence in today's society.

Although legislation has increased the mandates related to transitions beyond secondary education and these programs have shown success, more information on the transition process and the specific knowledge and skills needed to make the transitional effective are needed (Carter, Brock, & Trainor, 2014). Digital literacy skills are important as students transition (Bawden, 2008, Cihak, et al., 2015). Carter et al. (2014) suggest transition planning may be enhanced by holding high expectations for students with severe disabilities. Garwood & Ampuja (2019) support this idea, by describing that feelings of inferiority due to stereotypes about disabilities can negatively impact student confidence and performance. Therefore, learning more about expectations and practices related to technology for students with significant intellectual disabilities is necessary.

As students with significant intellectual disabilities who were administered AA-AAS in primary, junior high, and secondary school settings transition into post-secondary settings for engaging with society, employment, and education, more about the knowledge and skills these students have and need must be determined.

The current study examines K-12 teachers' perceptions about their own and their students' technology access and use. Data were collected from teachers who administered one state's AA-AAS. The current assessment program recently changed to a new administration format that allowed for greater use of technology during the assessment for both the student and test administrator. The questionnaire captured teachers' perceptions about a) their own and their students' access and ability to work with certain technologies; b) students' anticipated and actual behavior during the assessment; and c) the overall format and content of the test. The study aimed to explore the impact of increased technology use on the assessment. The study has implications for both K-12 educators and individuals in higher education, as educators work to address students' individualized postsecondary goals related to transitioning, education, employment, and independent living.

THEORETICAL FRAMEWORK

The theoretical framework of the current study is grounded in validity theory. Validity arguments for large scale testing programs encompass broad analyses that incorporate a variety of aspects of the assessments (AERA, APA, & NCME, 2014; Kane, 2001, 2006; Plake, 2002). Kane (2001, 2002, 2004, 2006, 2010) supports an argument-based approach to validity, where evidence is collected in support of (and against) the uses and inferences drawn from test results. Kane argues that in order to develop a sound validity argument, the proposed uses and interpretations of the test scores must be clearly and explicitly stated. An interpretative argument based on many types of evidence, both empirical and judgmental, can be formed to justify a claim that a proposed interpretation of test scores is valid. Sireci (2013) promoted the use of a validity argument centered on the purpose of the assessment, slightly simplified from an argument-based approach, when the purpose is integrated into test development. For the current assessment program, teachers were given the option of administering the assessment to the students using paper and pencil or on a device, so data about the use of and access to technology is relevant for future decision making regarding the assessment. Additionally, research suggesting the importance of digital literacy skills for students with significant intellectual disabilities highlights the importance of understanding teachers' and students' access to and use of digital technologies.

Technology-Infused Instruction of Students With Significant Intellectual Disabilities

Research related to instructing students with significant intellectual disabilities with technology is somewhat limited, but indicates promising results. Specifically, video-based instruction has shown favorable results (Ayres & Cihak, 2010; Ayres & Langone, 2002; Ayres, Langone, Boone & Norman, 2006). More recently, interactive videos have shown promising results for providing access to the general education curriculum for students with ID (Evmenova, Graff, & Behrmann, 2017). Several researchers have promoted the use of technology and assistive technology to teach literacy to students with severe

intellectual disabilities (Gunderson, Higgins, Morgan, Tandy & Brown, 2017; Jones, Gifford, Yovanoff, Al Otaiba, Levy, & Allor, 2019; Keefe & Copeland, 2011; Roberts, Leko, & Wilkerson, 2013). These authors encouraged additional research on the impact of using technology on students with intellectual disabilities.

Further, Stock, Davies, Wehmeyer, and Lachapelle (2011) looked past classroom instruction, and examined the benefits and disadvantages associated with technology use for community access (e.g., transportation, access to information sources such as schedules, kiosks, or directories) for individuals with intellectual disabilities. While the authors note safety as a primary concern that could limit independent community access for some individuals, their case study suggested potential for the use of technology for increasing access to the community for other individuals in this population. Due to the diversity of student cognition and communication levels of students within the population who take AA-AAS, the current use of and access to technology by students with significant intellectual disabilities must be further explored, as technology use is likely different based on factors such as communication level. The current study provides some insight on access and use of technology by surveying all test administrators for the AA-AAS in one state about students within the population of test takers.

Teacher Accountability Based on Alternate Assessments

In the current age of accountability, test scores are used as one method of teacher accountability; yet in order to effectively measure teacher effectiveness, research suggests that it is necessary that teachers first have access to needed professional development, and that their students have access to the curriculum, have reliable modes of communication, and are granted adequate opportunity to learn (Kearns, Kleinert, Thurlow, Gong, & Quenemoen, 2015). With so much uncertainty about the use of technology by students with significant intellectual disabilities, information about teachers' perceptions about the use of technology within the current assessment system was needed.

Behavior in Students With Significant Intellectual Disabilities

Behavior issues for all students with disabilities, including those with significant intellectual disabilities, can increase under the stress of learning academics, functional skills training, and high-stakes testing, For some students with significant intellectual disabilities, increased emphasis on academics can trigger behaviors that impede learning (Dwyer, Rozewski, & Simonsen, 2011; Geiger, Carr, & LeBlanc, 2010; Hagan-Burke, Gilmour, Gerow, & Crowder, 2015). Problematic behavior can be an obstacle for teachers during instruction (Dunlap, Iovannone, Wilson, Kincaid, & Strain, 2009).

Additionally, some students with significant intellectual disabilities lack expressive communication skills which can also evoke problematic behavior and negatively impact learning (Ducharme & Shecter, 2011). In addition to having language delays, students with significant intellectual disabilities may also have poor coping skills that result in the display of problematic behaviors, (Ducharme & Shecter, 2011). Special educators lack the time, resources, or support that is required to address the behavioral needs of students with significant intellectual disabilities in the era of high-stakes testing (West, McCollow, Kidwell, Umbarger, & Cote, 2013). Because of the possible impact of student behavior, the current study examined perceptions of student behavior teachers expected to encounter, and their perceptions of actual student behavior during administration.

Post-Secondary Transitions and Higher Education Opportunities for Students With Significant Intellectual Disabilities

The options for including students with intellectual disabilities into post-secondary settings have increased, in part due to additional legislation in the Higher Education Opportunity Act (HEOA, 2008) (Griffin, Summer, McMillan, Day, & Hodapp, 2012; May, 2012). HEOA contains provisions and incentives to improve post-secondary educational opportunities for students with intellectual disabilities including financial aid possibilities, and the authorization of a "model demonstration program for the development and expansion of high quality, inclusive model comprehensive transition and postsecondary education programs to meet the rising interest and demand for this type of educational experience among

students with ID and their families" (Lee, 2009, p. 2). Over 200 programs since 2010 have supported the enrollment of students with intellectual disabilities in colleges (Love, Baker, & Devine, 2019).

Little is known currently about the attitudes of college students toward the inclusion of students with intellectual disabilities in their classes, yet research is needed in this area because of differences with including students with intellectual disabilities in college from inclusion at the primary and secondary levels (Griffin et al., 2012, p. 235; May, 2012). The use of peer mentors to support individuals with intellectual disabilities in post-secondary settings showed the mentors had high expectations for students making friends and engaging on campus, as well as working part time in the community (Carter, Gustafson, Mackay, Martin, Parsley, Graves, … Cayton, 2019). May (2012) found that traditional college students experienced short term positive changes in attitudes about diversity after participation in a college inclusion program with students with intellectual disabilities.

While programs to support inclusion of students with disabilities in higher education are increasing, those that involve academic coursework are more limited (May, 2012), yet findings are encouraging and suggest the use of technology is relevant. O'Connor, Kubiak, Espiner, & O'Brien (2012) found that lecturers were open to developing accessible instructional practices for students with intellectual disabilities who were auditing their higher education courses. Love and colleagues (2019) highlight the importance of using multimedia and other universal design for learning (UDL) strategies to better include students in academic courses. Evmenova & Behrmann, (2014) found the use of adapted videos to be promising. Finally, Giust & Valle-Riestra (2017) examined a postsecondary transition program for students with intellectual disabilities and found ipads were useful tools for the students. As students with significant intellectual disabilities take advantage of the opportunities afforded them in post-secondary settings, more information about their knowledge and skills with respect to technology will continue to inform policy and practice. The current study provides some insight into the use of technology by students with significant intellectual disabilities in one state, by surveying test administrators about their use of technology during the statewide AA-AAS.

CONTEXT

AA-AAS Structure

The state's AA-AAS is a set of assessments in English Language Arts (ELA), Math, and Science. The ELA and Math assessments are administered to students in grades 3 through 8 and 11 while the Science test is administered to students in grades 4, 8, and 11. The content of all three subject area tests assesses alternate standards within each content area. The alternate standards are based on grade level standards for each respective content area, but are reduced in depth, breadth, and complexity such that they represent a reasonable set of expectations for students with significant intellectual disabilities.

The assessments are individually and orally administered by a student's teacher or other test assessor who knows the student well. There is no expectation that the student will independently read the test items and/or answer choices, although some students do read the items independently. The assessor is responsible for administering each item to the student using the provided item scripts and entering the student's responses into the digital system. The items are standardized through scripting, but assessors are allowed to modify the language of the item to more accurately reflect the everyday vocabulary used during instruction. Assessors are also encouraged to use any accommodations (e.g., manipulatives) used during instruction for the assessment in an effort to maintain consistency between the instructional and testing environments.

Items and answer choices are presented in picture format. Answer choices and contextual images may have words and phrases, but are presented with picture support. Even though the test is available in both digital and paper format, both formats present the same two-dimensional images.

Student performance is recorded via digital media and these recordings are uploaded to the digital site. Verification of student responses and adherence to the administration protocol are evaluated during score validation conferences following the close of the assessment window. During the conferences, scorers

view a random selection of media for each assessor and verify fidelity of the test administration protocol and accuracy of student responses entered into the digital system.

The test features three (3) administration modes in which the digital tests were a direct representation of the non-digital tests:

1. A fully-digital option in which the assessor used an electronic device to access test items and record student responses to each item. In addition, the student viewed the answer choices on a second electronic device.
2. A hybrid option in which the assessor used an electronic device to access test items and record student responses to each item. However, the student viewed answer choices using the provided printed student materials booklet.
3. A non-digital option in which the assessor printed a copy of the test items to read and entered student responses into a data entry portal. In addition, the student viewed answer choices using the provided printed student materials booklet.

Student Population

Students with significant intellectual disabilities are a diverse population with a range in level of communication, level of independence, and ability to function at an abstract level. Each year the state's AA-AAS assesses approximately 19,000 students in grades 3 through 8 and 11. The majority of these students tend to be male (68%), white/not Hispanic (55%), with a primary disability category identified as intellectual disability (40%) or autism (37%).

If the assessor believed a student is unable to participate meaningfully in the tests despite accommodations, they were allowed to discontinue the test early. Lack of meaningful participation was defined as three consecutive skills during administration of the first four items on the test in which the student was only passively participating. Every year, approximately 7% of the tested population has a test which is ceased early due to lack of engagement.

METHODS

The study employed large-scale, cross-sectional survey research. The target population was test administrators of one state's AA-AAS. The survey instrument was developed by the assessment team in order to collect information about several aspects of the AA-AAS. The use of large scale survey research to examine teacher perceptions related to AA-AAS and students with significant intellectual disabilities is prevalent and encouraged in the literature (Cameto, Bergland, Knokey, Nagle, Sanford, & Kalb, 2010; Flowers, Ahlgrim-Delzell, Browder, & Spooner, 2005; Kampfer, Horvath, Kleinert, & Kearns, 2001; Restorff, Sharpe, Abery, Rodriguez, & Kim, 2012; Young-Gyoung, Angell, O'Brian, Strand, Fulk, & Watts, 2006).

Survey Sample

A survey link was sent to all assessors (n = 3,552) that had administered the state's AA-AAS to at least one student during the 2017-2018 assessment cycle. Assessors were paid an incentive to complete the survey. From the survey links sent, a total of 1,586 teachers (45%) provided responses. Throughout this manuscript, percentages that do not sum to 100% reflect missing data for individual items.

Almost all of the respondents were female (n = 1,422, 89.6%) and Caucasian (n = 1,512, 95.3%). Additionally, all respondents had earned at least a bachelor's degree and teacher certification in at least one area, and most respondents reported being certified in special education (n = 1,560, 98.3%). Respondents also reported earning other certifications including early childhood or elementary education (n = 979, 61.7%). Additionally, over 90% of the respondents reporting earning a bachelor's degree plus additional credits (n = 363, 22.9%), a master's degree (n = 495, 31.2%), a master's plus additional credits (n = 610, 38.5%), or a doctorate (n = 10, 0.6%). Further, ninety-six percent (n = 1,522) of the respondents

indicated their primary position was special education teacher during the school year. These results suggest that respondents to the survey were certified teachers who administer the AA-AAS.

Instrument

The questionnaire used in the current study was intentionally designed to measure different aspects related to technology, including: Technology Access and Experience of Teachers; Events during Assessment; Technology Experience of Students; Preparation Time; Behavior during Administration; Format of Administration; Digital Presentation of Test Items; Delivery of Student Materials; Non-Digital Use; and Electronic Entry of Student Responses. Items were generated based on feedback from assessors during an earlier pilot of the digital delivery system, concerns raised by stakeholders in planning meetings, literature concerning technology and students with significant intellectual disabilities, and specific changes being made to the assessments to accommodate digital delivery options.

RESULTS

The results are organized by topic area addressed by the questionnaire.

Access to and Knowledge of Technology

Teachers' reported access to the technologies required by the AA-AAS is at a high level, with all respondents reporting that they have access to a computer, laptop, or tablet. The vast majority of teachers reported having access to a computer for individual students (n = 1,418, 89.5%), having staff available to help with computer tasks (n = 1,464, 92.4%), having staff to help solve computer problems (n = 1,495, 94.5%), having reliable access to the internet in their buildings (n = 1,426, 90.0%), and having access to two technologies that can be used simultaneously (n = 1,397, 88.3%). Slightly fewer respondents, but still over four-fifths of respondents, reported having fast internet (n = 1,319, 83.3%). Most test administrators also reported being able to complete the basic required tasks for test administration such as video recording and uploading files. See Table 1 for results related to access to and knowledge of technology of the teachers.

TABLE 1
TEACHER ACCESS TO TECHNOLOGY

Item	Don't Know		No		Yes		Total
	n	%	n	%	n	%	n
I have access to a computer at school for myself when I need it.	0	0.0%	2	0.1%	1583	99.9%	1,585
I have access to a computer at school for individual students when I need it.	6	0.4%	160	10.1%	1418	89.5%	1,584
I have access to a tablet at school for myself when I need it.	16	1.0%	459	29.0%	1109	70.0%	1,584
I have access to a tablet at school for individual students when I need it.	16	1.0%	422	26.7%	1145	72.3%	1,583
I have access to a digital video camera on a laptop or tablet when I need it.	90	5.7%	267	16.8%	1228	77.5%	1,585
I have access to a stand-alone digital video camera when I need it.	149	9.4%	350	22.1%	1085	68.5%	1,584
I have access to an interactive White Board (SMART board, Promethean board) when I need it.	11	0.7%	501	31.6%	1073	67.7%	1,585
Staff are available to help me with computer tasks, if needed.	18	1.1%	102	6.4%	1464	92.4%	1,584
Staff are available to help me solve computer problems or issues, if needed.	13	0.8%	74	4.7%	1497	94.5%	1,584
My school/building network has reliable access to the Internet.	6	0.4%	152	9.6%	1426	90.0%	1,584
My school/building network has fast access to the Internet.	22	1.4%	243	15.3%	1319	83.3%	1,584
I have access to two technologies that can be used simultaneously (e.g., 2 computers, computer and tablet, tablet and Smart Board).	21	1.3%	165	10.4%	1397	88.3%	1,583

Results shown in Table 1 suggest that teachers who administer the AA-AAS have access to technologies needed for electronic entry of student responses and recording of student assessments. The majority have access to additional devices to allow for electronic delivery of test materials to students. Additionally, the vast majority test administrators have the capabilities to performing the tasks required for administration of the AA-AAS, or can access staff to help with the tasks. These results are promising for assessing students digitally, and indicate that teachers and students have access to such technologies during instruction.

Adverse Events During Assessment Related to Technology

Participants were asked sets of questions about any events that may have occurred during the assessment that could impact performance. Most participants reported that they did not experience any events that delayed or prevented administration of items (n = 1,274, 80.3%); electronic entry of student responses (n=1,438, 90.7%); and uploading a partial or complete video (n = 1,302, 82.5%). When delays occurred, they mainly resulted from delays due to video recording errors such as devices shutting off, batteries dying, lack of device storage, or slow/lost internet. Overall, over 80% of the test administrators

reporting stated they did not have problems that delayed or prevented administration of test items or uploading videos.

Over 90% reported that they did not have problems that delayed or prevented electronic entry of student responses. When individuals who had problems that delayed or prevented administration, entry, or upload, they described the problems. A number of technology-related issues were presented in each of the categories related to administration, electronic entry, and technology use. Many respondents provided the same or similar comments for each category, such as internet problems including slow internet connections, which impacted all three areas of administration of test items, entry of student responses, and uploading of student videos.

Overall, the issues related to errors recording and storing videos on devices; time required to compress and upload files; and internet connection issues were reported the most. The largest coded categories related to adverse events involved recording errors, batteries dying, slow internet, internet connecting errors, and problems compressing and uploading files.

Technology Experience of Students

Participants were asked a small set of questions about their students' abilities to independently use an interactive electronic device such as an iPad to perform a number of tasks. Since many test administrators teach several students, they were asked to represent the percentage of their students who can perform the tasks. Over half of the teachers reported that more than three-quarters of their students can select a response option by touch (51.6%, n = 818); and close to half (n = 694, 44.4%) reported that more than three-fourths of their students could independently scroll by touching an electronic device. Further, approximately half of the teachers (n = 835, 53.4%) reported that half or more of their students could independently sequence option choices. Additionally, approximately 15% or fewer teachers reported that none of their students could select a response option by touch (n = 194, 12.2%), sequence options by touch (n = 252, 16.1%) or scroll by touch (n = 203, 13.0%). Since a strong majority of teachers teach at least some students who can independently perform interactive tasks with technology, the data suggest that the majority of students who take the AA-AAS can perform such tasks; but a subset of students cannot. See Table 2 for additional information regarding students with significant intellectual disabilities who can perform interactive tasks on an electronic device.

TABLE 2
PERCENTAGES OF STUDENTS WHO CAN INDEPENDENTLY PERFORM INTERACTIVE TASKS

Item	None		1%-25%		26%-50%		51%-75%		More than 75%		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Select a response option by touch	194	12.2%	173	10.9%	169	10.7%	230	14.5%	818	51.6%	1,584	100.0%
Sequence option choices by touch	252	16.1%	232	14.8%	246	15.7%	241	15.4%	594	38.0%	1,565	100.0%
Scroll by touch	203	13.0%	202	12.9%	207	13.2%	257	16.4%	694	44.4%	1,563	100.0%

Student and Teacher Preferences

When asked for preferences for students using interactive screens during the AA-AAS, more than half reported students should have the option to either use an interactive screen if teachers verify responses (n = 722, 45.5%) or if teachers choose whether students verify the responses (n = 462, 29.1%). Only 10% of respondents reported students should not have such access. These results suggest that a meaningful subset of students taking the AA-AAS would be able to interact with a touch screen during administration, with teacher oversight; yet there also remains a subset of students taking the assessment who would not be capable of this type of interaction. The majority of test administrators reported there should be a choice for students to interact with the screen, but with verification of the response.

Student Behavior With Technology

Teachers were asked questions about their concern about student behavior before the assessment, and also about the actual student behavior during the assessment. Prior to assessing, more than half of the respondents were somewhat or very concerned that their students would become agitated due to the act of being assessed and approximately one-quarter to one-third were somewhat or very concerned the students would mishandle technology, break technology, misbehave because teacher was using the computer, become agitated because teacher was using the computer, misbehave due to presentation of items on screen, or become agitated due to presentation of items on screen. Less than 10% of assessors were concerned that students would break technology, misbehave or become agitated because the teacher was using technology, or because items are on a screen.

Overall, just over one fourth (n = 443, 27.9%) of respondents indicated that students became agitated to a moderate or large degree due to the act of being assessed, representing about half as many as those who reported being concern prior to the assessment. Generally, more than 70% of respondents indicated the other behaviors did not occur at all, and less than 10% of respondents indicated that their students exhibited those other behaviors to a moderate or high degree during the assessment. See Tables 5 and 6 for information about student behavior with technology.

TABLE 3
CONCERN WITH NEGATIVE BEHAVIORS DURING THE AA-AAS

	Not at all concerned		Somewhat concerned		Very Concerned		Total		
	n	%	n	%	n	%	Mdn	M	SD
Become agitated due to the act of being assessed.	591	37.3%	722	45.6%	270	17.1%	2	1.8	0.71
Mishandle technology	981	62.0%	440	27.8%	160	10.1%	1	1.5	0.67
Break technology	1,200	76.1%	260	16.5%	117	7.4%	1	1.3	0.60
Misbehave because teacher is using the computer	1,152	73.0%	327	20.7%	99	6.3%	1	1.3	0.59
Become agitated because teacher is using the computer	1,170	74.0%	310	19.6%	101	6.4%	1	1.3	0.59
Misbehave due to presentation of items on screen	1,110	70.3%	338	21.4%	130	8.2%	1	1.4	0.63
Become agitated due to presentation of items on screen	1,118	70.9%	323	20.5%	136	8.6%	1	1.4	0.64

TABLE 4
ACTUAL BEHAVIOR DURING THE ADMINISTRATION OF THE AA-AAS

	N/A		Not at all		To a small degree		To a moderate degree		To a large degree		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Become agitated due to the act of being assessed.	13	0.8%	638	40.2%	492	31.0%	300	18.9%	143	9.0%	1,586	100
Mishandle technology	124	7.8%	1170	73.9%	191	12.1%	69	4.4%	29	1.8%	1,583	100
Break technology	119	7.6%	1360	86.3%	49	3.1%	32	2.0%	16	1.0%	1,576	100
Misbehave because teacher is using the computer	84	5.3%	1218	77.0%	174	11.0%	79	5.0%	26	1.6%	1,581	100
Become agitated because teacher is using the computer	79	5.0%	1230	77.7%	167	10.5%	73	4.6%	34	2.1%	1,583	100
Misbehave due to presentation of items on screen	186	11.7%	1120	70.8%	145	9.2%	100	6.3%	32	2.0%	1,583	100
Become agitated due to presentation of items on screen	188	11.9%	1110	70.3%	146	9.2%	95	6.0%	40	2.5%	1,579	100

Larger percentages of assessors were concerned with behaviors before the test, but many fewer (1 – 2%) reported misbehaviors occurring to a large degree during the test. Overall, just over one fourth (n = 443, 27.9%) of respondents indicated that students became agitated to a moderate or large degree due to the act of being assessed. See Table 6 for data related to actual student behavior.

Format of Administration

Assessors were asked about the format they used to assess their students on the AA-AAS, including how they accessed test materials and recorded student responses. The majority (n = 1,137, 71.8%) of assessors accessed digital item scripts rather than downloading and printing materials, and most recorded student responses digitally (n = 1,397, 88.2%). The breakdown for accessing student materials digitally versus paper copies was split nearly in half. Table 5 provides the summary of data regarding the format of

administration. This is relevant because it could indicate teachers do not believe at least some of their students can engage with digital materials.

TABLE 5
FORMAT OF ADMINISTRATION OF THE AA-AAS

	Digital		Paper Copy		Total	
	n	%	n	%	n	%
Accessed Test Item Scripts	1,137	71.8%	446	28.2%	1,583	100.0%
Accessed Student Materials	830	52.4%	754	47.6%	1,584	100.0%
Recorded Student Responses	1,397	88.2%	187	11.8%	1,584	100.0%

Digital Presentation of Test Items

Assessors were asked about their opinions about the use of the computer delivery of the test items on the AA-AAS. Respondents who reported using digital test materials were asked to respond to a set of questions about computer delivery, and respondents who reported using a paper copy were asked to respond to a separate set of items. Respondents were asked directly if they used a computer to read the test items to their students, and 69.2% (n = 1,098) of teachers reported doing this. These individuals were then asked a set of closed-ended items about their use of digital presentation of the test materials, with results provided in Table 6.

Overall, assessors who utilized the digital item scripts found the site easy to access and navigate, with approximately 90% or more of respondents agreeing or strongly agreeing with survey items related to these topics, including easily accessing the AA-AAS website (n = 1,069, 97.5%), independently accessing the website (n = 975, 88.8%), navigating the website (n = 1,058, 96.5%), easily accessing student's assessment (n = 1,043, 95.2%), advancing through the assessment easily (n = 1,042, 95.0%), and easily following prompts (n = 984, 89.6%). Additionally, the vast majority of respondents (n = 1,034, 94.4%) reported that they like the online system of delivering test items.

Approximately 10% to 20% of respondents indicated they needed help to navigate the site, access their student's assessment, or that they became confused when trying to follow the prompts on the screen. At the same time, the vast majority of respondents (n = 1,034, 94.4%) reported that they like the online system of delivering test items. Given this was the first administration of the redesigned format these results are quite promising.

TABLE 6
PERCEPTIONS ABOUT THE USE AND NAVIGATION OF COMPUTER DELIVERY FOR ASSESSORS WHO USE DIGITAL TEST MARTIALS

	Strongly Disagree		Disagree		Agree		Strongly Agree		Total		
	n	%	n	%	n	%	n	%	Mdn	M	SD
I was able to access the *AA-AAS* website easily.	20	1.8%	8	0.7%	366	33.4%	703	64.1%	4	3.6	0.60
I needed the help of others in order to access the *AA-AAS* website.	594	54.1%	381	34.7%	68	6.2%	54	4.9%	1	1.6	0.81
I was able to navigate through the tabs on the AA-AAS website	17	1.5%	22	2.0%	453	41.3%	605	55.2%	4	3.5	0.62
I was able to access my student's assessment easily.	21	1.9%	32	2.9%	450	41.1%	593	54.1%	4	3.5	0.65
I needed the help of others to access my student's assessment.	574	52.3%	360	32.8%	106	9.7%	57	5.2%	1	1.7	0.85
I was able to advance through the assessment easily.	21	1.9%	33	3.0%	441	40.2%	601	54.8%	4	3.5	0.65
I experienced problems advancing through the assessment.	544	49.5%	423	38.5%	89	8.1%	42	3.8%	2	1.7	0.78
It was easy for me to follow the item prompts on the computer screen.	29	2.6%	85	7.7%	512	46.6%	472	43.0%	3	3.3	0.72
I became confused when trying to follow the item prompts on the computer screen.	414	37.8%	464	42.4%	179	16.4%	37	3.4%	2	1.9	0.81
The online system of delivering the test items is confusing for me.	487	44.5%	479	43.7%	97	8.9%	32	2.9%	2	1.7	0.75
Overall, I like the online system of delivering test items.	22	2.0%	39	3.6%	486	44.4%	548	50.0%	4	3.4	0.66

Digital Presentation of Student Materials

Respondents were also asked to provide the format they used to deliver student materials. More than half of the respondents did not use an electronic device for student materials (n = 920, 58.0%), and 42.0% (n = 666) did utilize electronic student materials. Those 666 who reporting using electronic student

materials were asked about the device they used. Results showed that laptops were used most often (n = 381, 57.4%), followed by tablets (n = 221, 33.3%), other (n = 37, 2.3%), and white boards (n = 14, 0.9%). Options in the 'other' category were provided by 25 individuals, and included Chromebooks (n = 6), desktop computers (n = 11), whiteboard and tablet (n = 2), projector (n = 2), personal electronic device (n=2), camera (n = 1), and television (n = 1). Respondents who reported using electronic delivery for materials were asked additional questions about their views on their use of the electronic delivery of the student materials for the AA-AAS. See Table 7 for a summary of responses.

Approximately 90% of respondents who utilized the electronic delivery of student materials agreed or strongly agreed that they could display the student's view on another device easily (n = 601, 91.4%), independently use the website (n = 563, 85.3%), that their students could attend to materials on a screen (n = 585, 88.9%), that they will use the online delivery system for student materials again (n = 586, 89.5%), that they prefer the online system (n = 585, 89.0%), that the online system is *not* confusing for them (n = 596, 90.7%), and overall, they like the online system (n = 592, 90.8%). These responses suggest high levels of satisfaction with the electronic delivery of student materials for those administrators who used this option.

TABLE 7
PERCEPTIONS ON THE USE OF ELECTRONIC DELIVERY OF STUDENT MATERIALS

	Strongly Disagree		Disagree		Agree		Strongly Agree		Total		
	n	%	n	%	n	%	n	%	Mdn	M	SD
I was able to display the student's view on another device easily.	18	2.7%	39	5.9%	267	40.6%	334	50.8%	4	3.4	0.72
I needed the help of others to be able to display the student view on another device.	329	49.8%	234	35.5%	77	11.7%	20	3.0%	2	1.7	0.80
My student(s) were able to ATTEND TO the items displayed in electronic format.	26	4.0%	47	7.1%	327	49.7%	258	39.2%	3	3.2	0.75
I used the online delivery of student materials this year, but will not do it again.	320	48.9%	266	40.6%	46	7.0%	23	3.5%	2	1.7	0.76
I prefer the online delivery of student materials.	20	3.0%	52	7.9%	244	37.1%	341	51.9%	4	3.4	0.76
The online system of delivering student materials is confusing for me.	328	49.9%	268	40.8%	47	7.2%	14	2.1%	2	1.6	0.71
Overall, I like the online system to deliver the student materials.	15	2.3%	45	6.9%	248	38.0%	344	52.8%	4	3.4	0.72

Non-Digital Presentation of Test Items

Assessors who used non-digital test materials were asked a set of questions about using a downloaded copy of the test to deliver the items to their students. Respondents were asked directly if they used a computer to read the test items to their students, and 69.2% (n = 1,098) of teachers reported doing this, while 488 (30.8%) reported not using a device to present item scripts. The individuals who used print copies of the item scripts were asked a set of questions about the test, and results are provided in Table 8. Over 94% of these users agreed or strongly agreed that they were able to easily access the AA-AAS website (n = 467, 96.5%), navigate the tabs (n = 469, 96.7%), and access their student's assessment easily (n = 454, 94.0%). Fourteen percent of respondents needed the help of others.

TABLE 8
PERCEPTIONS ABOUT THE USE AND NAVIGATION OF COMPUTER DELIVERY FOR ASSESSORS WHO USED NON-DIGITAL TEST MATERIALS

	Strongly Disagree		Disagree		Agree		Strongly Agree		Total		
	n	%	n	%	n	%	n	%	Mdn	M	SD
I was able to access the AA-AAS website easily.	8	1.7%	9	1.9%	187	38.6%	280	57.9%	4	3.5	0.62
I needed the help of others in order to access the AA-AAS website.	247	51.0%	171	35.3%	44	9.1%	22	4.5%	1	1.7	0.82
I was able to navigate through the tabs on the AA-AAS website (e.g., Training, Students, Tests).	7	1.4%	9	1.9%	223	46.0%	246	50.7%	4	3.5	0.61
I was able to access my student's assessment easily.	9	1.9%	20	4.1%	213	44.1%	241	49.9%	3	3.4	0.66
I needed the help of others to access my student's assessment.	231	47.6%	181	37.3%	46	9.5%	27	5.6%	2	1.7	0.85

Non-digital Presentation of Student Materials

Participants who used non-digital test materials were asked to answer a set of questions about their use of the provided printed Student Materials Booklets to deliver the answer choices for the tests. Seventy-four percent (n = 361) of these respondents reported that their students could attend to items displayed in paper format, while 13.5% (n = 66) reported their students could not attend to the materials. Under two-thirds of this group (n = 218, 61%) reported their students needed printed materials to answer the test times, while at the same time, just under half (n = 218, 44.5%) reported that they will consider using the electronic presentation of student materials for the next assessment cycle. Less than half agreed or strongly agreed (n = 214, 43.8%) their student(s)' performance would be lowered if items were presented digitally.

TABLE 9
PERCEPTIONS ABOUT THE USE AND NAVIGATION OF ITEM DELIVERY FOR ASSESSORS WHO USED NON-DIGITAL TEST MATERIALS

Answer each of the following with respect to format.	Strongly Disagree		Disagree		Agree		Strongly Agree		Total		
	n	%	n	%	n	%	n	%	Mdn	M	SD
My student(s) were able to ATTEND TO the items displayed in paper format.	24	4.9%	42	8.6%	211	43.2%	150	30.7%	3	3.1	0.81
I would consider using the electronic presentation of student materials next year.	75	15.4%	135	27.7%	176	36.1%	42	8.4%	3	2.4	0.89
My student(s) needed printed items to answer the test questions.	27	5.5%	100	20.5%	207	42.4%	91	18.6%	3	2.9	0.83
My student(s)' performance would be lowered if items were presented digitally.	38	7.8%	172	35.2%	143	29.3%	71	14.5%	2	2.6	0.87

Out of the total number of respondents (n = 1,586), 488 reported using printed materials, and out of those, 298 agreed or strongly agreed their student(s) needed printed items to answer the test questions, which constitutions approximately 19% of the total test administrators who responded to the survey.

DISCUSSION

The current study examined teachers' access to and use of technological devices during assessments, as well as any perceived adverse events or negative impact on assessment outcomes due to the use of technology. Additionally, the assessment system allowed for assessors to choose the test administration option; fully-digital, hybrid, or non-digital, for their students. These choices provide insight into teacher preferences for use of technology in assessing students with intellectual disabilities.

Results from this descriptive study suggest that access to technology and the internet is widespread for teachers of students with significant intellectual disabilities for a large mid-Atlantic state. While inferences need to be drawn carefully due to the descriptive nature of the study, the large number of assessors stating that they were able to access and navigate the digital system easily suggest teacher choice between digital or non-digital materials was not dictated by confusion over the digital site and/or administration procedures, access to digital site, but by individualized reasoning or personal philosophy.

Regardless of test administration option chosen, teachers are using technology in their classrooms for students with significant intellectual disabilities and a large majority of these students can independently perform specific tasks (scroll, select an option, sequence options) on an electronic device. Teachers, however, do report that a small proportion of their students cannot do these tasks. Whether this is due to

severe physical limitations of the students, student limitations that could be overcome with additional technological advances, or teacher philosophy is unknown.

Assessors were initially concerned that moving to a digital assessment would trigger negative behavioral events in students, but only a small percentage of assessors actually reported negative behavioral events during the assessment. Additionally, most assessors believed the observed negative behaviors were due to the stress of being assessed rather than the use of technology during the assessment.

Given the choice of how to access their own test materials, assessors largely chose to use the digital option. If assessors chose the digital student materials option, they largely believed that their students could attend to digital images and that the assessment outcomes were not negatively impacted by using the digital images. Also, a substantial proportion of assessors would prefer that students interact with their own electronic device to make their answer selections, especially if an assessor verification method of student choice were put in place.

Assessors choosing the non-digital student materials option, likewise, believed that their students could attend to non-digital images. However, a small proportion of assessors choosing the non-digital option believed that their students' performances would be negatively impacted by using digital student materials. Again, while inferences need to be drawn carefully, it would seem that this could be the reasoning behind teachers' selection of the non-digital option. Finally, a small proportion of assessors choosing the non-digital student materials option stated they would try the digital option during the next assessment cycle now that they were familiar with the system. This suggests that some assessors initially selected the non-digital option because they were not familiar with it.

As students taking AA-AAS in primary, junior high, and secondary schools transition into higher education programs, knowledge about their experiences and comfort level with technology is needed. Federal legislation in the United States including ESSA (2015) and IDIEA (IDIEA, 2004) have driven the access and accountability for high quality education for students with disabilities in the K-12 setting. The HEOA (HEOA, 2008) continues to drive students' access as they transition to higher education. While there are over 200 programs nationally to support students' with significant intellectual disabilities access to higher education, research on these programs remains limited. Research that does exist suggests that use of technology is important for fostering success (Evmenova & Behrman, 2014; Giust & Valle-Riestra, 2017; Love et al. 2019; O'Connor et al., 2012). Information about the knowledge, skills, and experiences of students with intellectual disabilities prior to entering college transition programs is therefore important for informing these programs. The current study suggests that students and their teachers have access to technological devices, their use during assessments was positively perceived, many of the students can actively engage with devices by scrolling, select an option, or sequence options, and in general use of technology did not elicit unwanted behaviors.

CONCLUSION

While some research suggests that teachers utilize technology and assistive technology to instruct students with disabilities, due to small sample sizes or limited technology-enhanced treatments, many researchers have suggested a need for additional research in this area. Additionally, research suggests the importance of digital literacy skills for students with significant intellectual disabilities, so, it becomes important to understand teachers' and students' access to and use of digital technologies. Finally, as students who take AA-AAS transition into post-secondary education opportunities, more information is needed about their skill set so that such programs can be informed. This study provides some baseline data that can be examined over time as more assessments including AA-AAS move to digital formats; more students with significant intellectual disabilities are exposed to, engage in, and increase their digital literacy; and more students with significant intellectual disabilities participate in post-secondary educational and employment opportunities.

ACKNOWLEDGEMENTS

The contents of this report reflect the views of the author(s) who is (are) responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or Policies of the Pennsylvania Department of Education, Bureau of Special Education, or the Commonwealth of Pennsylvania at the time of publication. This report does not constitute a standard, specification, or regulation.

REFERENCES

American Educational Research Association (AERA), American Psychological Association (APA), & National Council on Measurement in Education (NCME). (2014). *Standards for educational and psychological testing*. Washington, DC: American Psychological Association.

Ayres, K. M., & Cihak, D. F. (2010). Computer- and video-based instruction of food-preparation skills: Acquisition, generalization, and maintenance. *Intellectual and Developmental Disabilities*, *48*, 195–208. doi:10.1352/1944-7558-48.3.195

Ayres, K. M., & Langone, J. (2002). Acquisition and generalization of purchasing skills using a video enhanced computer-based instructional program. *Journal of Special Education Technology*, *17*(4), 15–28.

Ayres, K. M., Langone, J., Boone, R. T., & Norman, A. (2006). Computer-based instruction for purchasing skills. *Education and Training in Developmental Disabilities*, *41*, 253–263.

Bawden, D. (2008). Origins and concepts of digital literacy. In C. Lankshear & M. Knobel (Eds.), *Digital literacies: Concepts, policies and practices* (pp. 17–32). New York: Peter Lang.

Bouck, E. C. (2012). Secondary students with moderate/severe intellectual disability: Considerations of curriculum and post-school outcomes from the national longitudinal transition Study-2. *Journal of Intellectual Disability Research*, *56*(12), 1175-1186. doi:10.1111/j.1365-2788.2011.01517.x

Cameto, R., Bergland, F., Knokey, A-M., Nagle, K. M., Sanford, C., Kalb, S. C., & National Center for Special Education Research (ED). (2010). *Teacher perspectives of school-level implementation of alternate assessments for students with significant cognitive disabilities*. A report from the National Study on Alternate Assessments. NCSER 2010-3007. National Center for Special Education Research.

Carter, E. W., Brock, M. E., & Trainor, A. A. (2014). Transition assessment and planning for youth with severe intellectual and developmental disabilities. *The Journal of Special Education*, *47*(4), 245–255. https://doi.org/10.1177/0022466912456241

Carter, E. W., Gustafson, J. R., Mackay, M. M., Martin, K. P., Parsley, M. V., Graves, J., Cayton, J. (2019). Motivations and expectations of peer mentors within inclusive higher education programs for students with intellectual disability. *Career Development and Transition for Exceptional Individuals*, *42*(3), 168–178.

Cihak, D. F., Wright, R., McMahon, D., Smith, C. C., & Kraiss, K. (2015). Incorporating functional digital literacy skills as part of the curriculum for high school students with intellectual disability. *Education and Training in Autism and Developmental Disabilities*, *50*(2), 155-171.

Donne, V., & Hansen, M. (2017). Teachers' use of assistive technologies in education. In L. Tomei (Ed.), *Exploring the New Era of Technology-Infused Education* (pp. 86-101). IGI Global. http://doi:10.4018/978-1-5225-1709-2.ch006

Ducharme, J. M., & Shecter, C. (2011). Bridging the gap between clinical and classroom intervention: Keystone approaches for students with challenging behavior. *School Psychology Review*, *40*(2), 257-274.

Dunlap, G., Iovannone, R., Wilson, K. J., Kincaid, D. K., & Strain, P. (2009). Prevent-teach-reinforce: A standardized model of school-based behavioral intervention. *Journal of Positive Behavior Interventions*, *12*(1), 9-22. doi:10.1177/1098300708330880.

Dwyer, K., Rozewski, D., & Simonsen, B. (2011). A comparison of function-based replacement behaviors for escape-motivated students. *Journal of Emotional and Behavioral Disorders*, *20*(2), 115-125. doi: 1063426610387432.
Education of All Handicapped Children Act (EHA), Pub. L. No. 94-142 (1975), now codified as Individuals with Disabilities Education Improvement Act, 20 U.S.C. § 1400 (2004).
Elementary and Secondary Education Act (ESEA), Pub. L. No. 89-750 (1965), 20 U.S.C. §161. Retrieved from https://www2.ed.gov/about/offices/list/oii/nonpublic/eseareauth.pdf
Every Student Succeeds Act (ESSA), Pub. L. No. 114-95 (2015) § 114 Stat. 1177.
Evmenova, A. S., & Behrmann, M. M. (2014). Enabling access and enhancing comprehension of video content for postsecondary students with intellectual disability. *Education and Training in Autism and Developmental Disabilities*, *49*(1), 45-59.
Evmenova, A. S., Graff, H. J., & Behrmann, M. M. (2017). Providing access to academic content for high-school students with significant intellectual disability through interactive videos. *Focus on Autism and Other Developmental Disabilities*, *32*(1), 18–30.
Flowers, C., Ahlgrim-Delzell, L., Browder, D., & Spooner, F. (2005). Teachers' perceptions of alternate assessments. *Research and Practice for Persons with Severe Disabilities (RPSD)*, *30*(2), 81–92.
Garwood, J. D., & Ampuja, A. A. (2019). Inclusion of students with learning, emotional, and behavioral disabilities through strength-based approaches. *Intervention in School and Clinic*, *55*(1), 46–51. https://doi.org/10.1177/1053451218767918
Geiger, K. B., Carr, J. E., & LeBlanc, L. A. (2010). Function-based treatments for escape-maintained problem behavior: A treatment-selection model for practicing behavior analysts. *Behavior Analysis in Practice*, *3*(1), 22-32.
Giust, A. M., & Valle-Riestra, D. M. (2017). Supporting mentors working with students with intellectual disabilities in higher education. *Journal of Intellectual Disabilities*, *21*(2), 144–157. https://doi.org/10.1177/1744629516651019
Griffin, M.M., Summer, A. H., McMillan, E. D., Day, T.L., & Hodapp, R. M. (2012). Attitudes toward including students. *Journal of Policy and Practice in Intellectual Disabilities*, *9*, 234-239. doi:10.1111/jppi.12008
Gunderson, J. L., Higgins, K., Morgan, J. J., Tandy, R., & Brown, M. R. (2017). Cognitively accessible academic lessons for students with intellectual disabilities using the iPad. *Journal of Special Education Technology*, *32*(4), 187–198.
Hagan-Burke, S., Gilmour, M. W., Gerow, S., & Crowder, W. C. (2015). Identifying academic demands that occasion problematic behaviors for students with behavioral disorders: Illustrations at the elementary school level. *Behavior Modification*, *39*(1), 215-241. doi:10.1177/0145445514566505.
Higher Education Opportunity Act (HEOA) of 2008, Public Law 110-315. (2008).
Individuals with Disabilities Education Act (IDEA) of 1990, 20 U.S.C. §1400 et seq. (1990).
Individuals with Disabilities Education Improvement Act (IDIEA) of 2004, 20 U.S.C. § 1400 et seq. (2004).
Jones, F. G., Gifford, D., Yovanoff, P., Al Otaiba, S., Levy, D., & Allor, J. (2019). Alternate assessment formats for progress monitoring students with intellectual disabilities and below average IQ: An exploratory study. *Focus on Autism & Other Developmental Disabilities*, *34*(1), 41–51.
Jones, N. L. (1995). *The individuals with disabilities education act: Congressional intent, report*. Washington D.C. Retrieved from https://www.everycrsreport.com/files/19950519_95-669A_72357debf6397779de2895cbebdc1b6bf73c4adc.pdf
Kampfer, S. H., Horvath, L. S., Kleinert, H. L., & Kearns, J. F. (2001). Teachers' perceptions of one state's alternate assessment: Implications for practice and preparation. *Exceptional Children*, *67*(3), 361–77.
Kane, M. T. (2001). Current concerns in validity theory. *Journal of Educational Measurement*, *38*(4), 319-342.

Kane, M. T. (2002). Validating high stakes testing programs. *Educational Measurement: Issues and Practice*, *21*(1), 31-41.
Kane, M. T. (2004). Certification testing as an illustration of an argument-based approach to validation. *Measurement: Interdisciplinary Research and Perspectives*, *2*(3), 135–170.
Kane, M. T. (2006). Validation. In R. Brennan (Ed.), *Educational measurement* (4th ed., pp. 17–64). Westport, CT: American Council on Education and Praeger.
Kane, M. T. (2010). Validity and fairness. *Language Testing*, *27*(2), 77-182. doi: 10.1177/0265532209349467
Kearns, J. F., Kleinert, H. L., Thurlow, M. L., Gong, B., & Quenemoen, R. (2015). Alternate assessments as one measure of teacher effectiveness. *Research and Practice for Persons with Severe Disabilities*, *40*(1), 20–35.
Keefe, E. B., & Copeland, S. R. (2011). What is literacy? The power of a definition. *Research & Practice for Persons with Severe Disabilities*, *36*(3/4), 92–99.
Lee, S. S. (2009). Overview of the federal Higher Education Opportunities Act. *Think College Insight Brief, Issue No. 1.* Boston, MA: Institute for Community Inclusion, University of Massachusetts Boston. Retrieved from https://thinkcollege.net/sites/default/files/files/resources/higher%20education%20opportunity%20act%20overview.pdf
Love, M. L., Baker, J. N., & Devine, S. (2019). Universal design for learning: Supporting college inclusion for students with intellectual disabilities. *Career Development and Transition for Exceptional Individuals*, *42*(2), 122–127.
May, C. (2012). Attitude change in college students. *Journal of Policy and Practice in Intellectual Disabilities*, 9, 240-246. doi:10.1111/jppi.12013
No Child Left Behind Act (NCLB) of 2001, 20 U.S.C. § 6311 et seq. (2001). Retrieved from https://www2.ed.gov/policy/elsec/leg/esea02/index.html
O'Connor, B., Kubiak, J., Espiner, D., & O'Brien, P. (2012), Lecturer responses to the inclusion of students with intellectual disabilities auditing undergraduate classes. *Journal of Policy and Practice in Intellectual Disabilities*, *9*, 247–256. doi: 10.1111/jppi.12009
Plake, B. S. (2002). Evaluating the technical quality of educational tests used for high-stakes decisions. *Measurement and Evaluation in Counseling and Development*, *35*, 144-152.
Pugach, M. C., & Warger, C. L. (2001). Curriculum matters: Raising expectations for students with disabilities. *Remedial and Special Education*, *22*(4), 194–213. https://doi.org/10.1177/074193250102200401
Restorff, D., Sharpe, M., Abery, B., Rodriguez, M., & Kim, N. K. (2012). Teacher perceptions of alternate assessments based on alternate achievement standards: Results from a three-state survey. *Research and Practice for Persons with Severe Disabilities*, *37*(3), 185–198.
Roberts, C. A., Leko, M. M., & Wilkerson, K. L. (2013). New directions in reading instruction for adolescents with significant cognitive disabilities. *Remedial and Special Education*, *34*(5), 305–317.
Roach, A. T., & Elliott S. N. (2006). The influence of access to general education curriculum on alternate assessment performance of students with significant cognitive disabilities. *Educational Evaluation and Policy Analysis*, *28*, 181–94.
Sireci, S. G. (2013). Agreeing on validity arguments. *Journal of Educational Measurement*, *50*(1), 99–104.
Stock, S. E., Davies, D. K., Wehmeyer, M. L., & Lachapelle, Y. (2011). Emerging new practices in technology to support independent community access for people with intellectual and cognitive disabilities. *NeuroRehabilitation*, *28*(3), 261–269.
U.S. Department of Education. (1997). *History: Twenty-five years of progress in educating children with disabilities through IDEA*. Archived. Retrieved from https://www2.ed.gov/policy/speced/leg/idea/history.pdf

Wehmeyer, M. L., Palmer, S. B., Smith, S. J., Davies, D. K., & Stock, S. (2008). The efficacy of technology use by people with intellectual disability: A single-subject design meta-analysis. *Journal of Special Education Technology*, *23*(3), 21-30. https://doi.org/10.1177/016264340802300303

West, E. A., McCollow, M., Umbarger, G., Kidwell, J., & Cote, D. L. (2013). Current status of evidence-based practice for students with intellectual disability and autism spectrum disorders. *Education and Training in Autism and Developmental Disabilities*, *48*(4), 443–455.

Wu, Y-C., Thurlow, M. L., Albus, D. A., & Liu, K. K. (2020). *Trends in AA-AAS participation and performance for 2007-08 to 2016-17* (Data analytics #12). Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes.

Young-Gyoung K., Angell, M. E., O'Brian, M., Strand, K. H., Fulk, B. M., & Watts, E. H. (2006). Relationships among teachers' perspectives, self-reported practices, and concerns related to an alternate assessment system. *Teacher Education & Special Education*, *29(*2), 83–97.