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Accommodations in Digital Interactive STEM Assessment Tasks: Current Accommodations and Promising Practices for Enhancing Accessibility for Students With Disabilities

Kathleen Scalise[1], P. Shawn Irvin[2], Fahad Alresheed[3], Keith Zvoch[1], Huna Yim-Dockery[4], Sunhi Park[1], Britt Landis[3], Paul Meng[3], Bren Kleinfelder[1], Lauren Halladay[4], and Andrea Partsafas[1]

Abstract

In this article, we describe current research findings on assessment accommodations and universal design within the context of emerging interactive digital assessment tasks that employ simulations such as in science, technology, engineering, and mathematics (STEM). STEM education in many classrooms now includes digitally based activities such as science simulations and virtual laboratories that have been shown in some cases to promote learning gains. When such technologies are used in STEM assessments, a major challenge is to ensure assessments are accessible so all students can show what they know and can do. Federal laws and regulations including the Individuals with Disabilities Education Act, Elementary & Secondary Education Act, and Americans with Disabilities Act require that students with disabilities (SWD) be provided an opportunity to participate in educational programing and services available to nondisabled peers. In addition to implementing principles of universal design in assessment contexts, reasonable accommodations must be afforded to ensure accessibility. This article focuses on universal design and accommodations where the STEM construct is not adjusted or modified. Here, we employ synthesis of the research literature to document accessibility recommendations and practices around interactive assessment tasks, especially in STEM. We illustrate with an example and highlight directions that future development might take. The intention is to inform educators, school administrators, state and local policy makers, and assessment developers on the availability and use of accommodations in interactive assessment contexts such as simulation, and what is needed to ensure appropriate accessibility for SWD.

Keywords

accessibility, accommodations, STEM, students with disabilities, technology-enhanced assessments, technology-based assessments, simulations, serious games, digital learning, e-learning, ASES, APIP, WCAG, IDEA, ESEA, ADA

Introduction

New learning activities and assessments rapidly becoming available in science, technology, engineering, and mathematics (STEM) education often employ technologies such as digital devices, new media, and an extensive range of simulation and virtual interactivity. In assessments, evidentiary goals may include to measure student understanding of STEM concepts and complex problems such as in virtual simulations. A major challenge for such activities when used in assessment is to ensure that tasks are accessible such that all students are able to show what they know and can do (Haertel et al., 2010; Hansen, Liu, Rogat, Hakkinen, & Darrah, 2016).

Increasingly, teachers want to engage students and get them excited about what they are learning in STEM classes through

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Using Graduated Guidance to Teach iPad Accessibility Skills to High School Students With Severe Intellectual Disabilities

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Abstract

Advances in and the decreased cost of technology has resulted in a significant increase in educational programming that incorporates technology into the school curriculum. Specifically, the use of iPads has become quite common to support students social, communication, and academic outcomes in recent years; however, many students with moderate to severe disability do not have the access skills necessary to navigate these devices independently. This study investigated the effect of graduated guidance on iPad accessibility skill acquisition for three high school students with severe intellectual disability. Students were taught to swipe, drag, touch tap, minimize, and enlarge images on an iPad to access high-interest websites, images, and instructional resources. A multiple probe across students design was used to examine the effects of graduated guidance on the number of trials completed independently on each accessibility skill. Results indicated a functional relationship between the use of graduated guidance and student independent correct physical responses for all three students. Implications for practice and future research are discussed.

Keywords

graduated guidance, technology access, systematic instruction, intellectual disability

K–12 education has moved into the digital revolution with vengeance, primarily through the educational technology movement (Collins & Halverson, 2010). Advances in and the decreased cost of technology has resulted in a significant increase in educational programming that incorporates technology into the school curriculum. The North Central Regional Educational Laboratory (2005) reported 93% of classrooms have Internet access and technology is being used to support classroom curriculum. Now, over a decade later, it can be assumed that closer to 100% of classrooms would likely have access to and use technology, such as tablets, iPads, and smartboards, as special education has not been spared of the digital age.

Twenty-first-century classrooms prepare students for post-school outcomes through the use of technology, often through digital learning (Partnership for 21st Century Skills, 2007). Digital learning is any type of learning that is supported by technology and/or practice that uses technology to support the learner (e.g., blended and virtual learning, use of iPads, tablets, and virtual manipulatives). Recently, iPads and application downloads have become increasingly prevalent in school systems as a teaching tool. Third-quarter results for the 2014 fiscal year reported that the Apple Company has sold 13 million iPads to education customers globally, up from an estimate of 8 million sold the year prior (Etherington, 2013), and 1.5 million reported in January 2012 (Rao, 2012). iPads account for 94% of tablet usage in U.S. school districts (Cavanagh, 2014).

Special education research continues to support the use of technology to support the communication, behavioral, and educational needs of students with disability. For decades, the field of special education has supported the use of technology through augmentative and alternative communication (AAC) devices, prompting devices (e.g., video modeling), and computer-assisted instruction (Bouck, Satsangi, Doughty, & Courtney, 2014). However, in the past decade, additional technologies have been introduced to provide access to content-specific curriculum through the use of digital learning. For example, virtual manipulatives can provide students a more cohesive mode to "manipulate" theme-based engaging materials and have been proven an effective mode to provide math instruction to students with intellectual disability (Bouck et al., 2014). Mobile technology devices, such as cell phones, iPods, and iPads, have also gained substantial attention in recent years to support student learning (Ayres,

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Evaluating Immediate Feedback via Bug-in-Ear as an Evidence-Based Practice for Professional Development

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Abstract

Observation and performance feedback to support traditional training methods are central tools for preservice practitioner preparation and in-service practitioner professional development. Research highlights how some specific characteristics of feedback (e.g., the latency between behavior and feedback) can impact the effectiveness. One method of enhancing the effects of feedback may be immediate feedback delivered through bug-in-ear technology. This review identified 17 intervention studies that examined the use of immediate feedback via bug-in-ear with preservice and in-service practitioners. We evaluated these studies using What Works Clearinghouse quality standards and determined that immediate feedback with bug-in-ear technology has a strong evidence base for increasing frequency and accuracy of teaching behaviors of practitioners in a variety of classroom settings. This review discusses findings on that evidence base as well as findings on feasibility and acceptability of this intervention. We also discuss limitations of current research and potential directions for future research on this method.

Keywords

bug-in-ear, covert audio coaching, teacher preparation, professional development, evidence-based practice

To meet the needs of students with disabilities, special education practitioners must be prepared to use evidence-based practices with fidelity (Odom, 2008). Observation and dialogue have long been central tools in the preparation and professional development of special education practitioners (Posner, 2005). More specifically, performance feedback has been an established evidence-based practice for changing practitioners' behavior in the classroom (Fallon, Collier-Meek, Maggin, Sanetti, & Johnson, 2015; Solomon, Klein, & Politylo, 2012). Traditionally, feedback on the practitioner's performance has been delivered in a dialogue between the supervisor (e.g., university faculty, mentor teacher) and supervisee (i.e., the practitioner) after the observation has concluded (Posner, 2005). However, given advances in technology and literature on performance feedback's effects on practitioners' acquisition, maintenance, and generalization of skills (Fallon et al., 2015), new possibilities have emerged.

Conceptually speaking, the two most important pieces of performance feedback are positive reinforcement for well-executed teaching behaviors (e.g., correctly following an intervention protocol) and constructive feedback that provides actionable guidance on how to improve poorly executed teaching behaviors (Hattie & Timperley, 2007). Furthermore, research highlights specific characteristics of feedback that influence its effectiveness including immediacy, clarity, consistency, and relevance to the context (Cornelius & Nargo, 2014; Hattie & Timperley, 2007). Postobservation feedback methods provide practitioners the opportunity to change their behavior before working with students again but is not immediate enough to change a practitioner's behavior while teaching. Likewise, postobservation feedback is given outside of the context in which the behavior occurred and to which the feedback is meant to apply (i.e., when directly teaching students). Thus, what research has identified to be key characteristics of performance feedback are not fully utilized by postobservation methods.

Alternatively, immediate feedback creates opportunities for practitioners to change their behavior in the moment and avoid repeating errors throughout entire teaching sessions. Research indicates that increasing the repetitions of a correct behaviors and minimizing repetition of incorrect behaviors foster faster and more robust acquisition (Cooper, Heron, & Heward, 2007). Feedback given immediately can be more easily directly in the context that the feedback applies to, which may also aid in

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Efficacy of Video Modeling and Brief Coaching on Teacher Implementation of an Evidence-Based Practice for Students With Severe Disabilities

Matthew E. Brock, PhD[1,2], Rachel L. Seaman, PhD, BCBA-D[1], and Andrea L. Gatsch, MA, BCBA[1]

Abstract

Effective professional development strategies are needed to enable special educators to provide evidence-based instruction and support to students with severe disabilities. In this single-case design study, we measured the efficacy of video modeling and brief coaching to enable three elementary special education teachers to implement constant time delay and the impact of their implementation on student progress toward individualized goals. After receiving professional development, all three teachers implemented constant time delay with fidelity and promoted student progress on individualized goals. Teachers were able to identify and correct some of their own implementation errors by revisiting video models after attempting implementation. Teachers reported positive perceptions of the professional development model. We provide recommendations for how video modeling and brief coaching can be used in tandem to promote effective implementation of evidence-based practices.

Keywords

teacher training, video modeling, coaching, evidence-based practice, severe disabilities

Students with severe disabilities require intensive and effective intervention practices in order to make optimal progress on critical educational goals (Spooner, Knight, Browder, & Smith, 2012). Researchers have identified a number of practices that are highly effective in improving outcomes for this population. For example, teachers can improve academic outcomes with systematic instructional strategies such as constant time delay (Spooner et al., 2012), or reduce problem behaviors with function-based interventions such as functional communication training or differential reinforcement (Wong et al., 2015). These examples are only a subset of the growing repertoire of evidence-based practices that teachers might use to improve outcomes for students with severe disabilities.

Unfortunately, many special educators do not have a clear understanding of which practices are evidence based or the ability to implement these practices effectively. Descriptive studies show that many teachers are not familiar with the concept of evidence-based practice (Stahmer, Collings, & Palinkas, 2005) and report implementing unproven educational practices just as often as those with a strong evidence base (Burns & Ysseldyke, 2009). Furthermore, baseline data from experimental studies show that without focused professional development (PD), many special educators struggle to implement systematic instructional strategies (e.g., Brock & Carter, 2015) or function-based behavior reduction strategies (e.g., Bethune & Wood, 2013). Indeed, the gap between research and practice is substantial, and it poses a major threat to a special educator's ability to promote improved outcomes for students with severe disabilities.

PD, or the provision of any activity or material designed to promote or improve implementation of an educational practice (Brock et al., 2017; Brock & Carter, 2017), can help to close this research-to-practice gap. Meta-analyses of the teacher PD literature point to potential solutions. Specifically, a combination of two individual components of PD has been shown to be particularly effective in promoting teacher implementation fidelity of evidence-based practices: modeling and coaching with performance feedback (Brock & Carter, 2017; Brock et al., 2017). Modeling involves demonstrating for a teacher how to implement a given practice, and coaching with feedback

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A Comparison of Peer Network and Peer Video Modeling to Increase Positive Verbal Social Interactions in Young Children With Disabilities

Conrad Oh-Young[1], John Filler[1], Maryssa Kucskar[1,2], Jennifer Buchter[1], Kathleen O'Hara[1], and Jeff Gelfer[1]

Abstract

The ability to engage in positive social interactions is an important goal for young children with developmental disabilities (DDs). Peer-mediated intervention (PMI), one category of interventions often employed with those who show social skill deficits, involves use of typical peers who live model appropriate behaviors. A second frequent category uses videos of actors who model appropriate behaviors, video modeling (VM). There were two purposes of this study. The first was to compare the relative effectiveness of peer networking (PN), a type of PMI, and peer video modeling (PVM), a type of VM, to determine which was better at increasing the number of positive verbal social interactions performed by young children with DDs. The second was to determine whether the positive effects of the best treatment generalized to the playground. Mixed findings revealed that PN was more effective than PVM for a child with autism and for a child with language delays with evidence of generalization and that both were equally effective for a third child. Neither was effective for the fourth and fifth participants.

Keywords

social interaction, preschool, peer-mediated intervention, single-case research design, video modeling

Social skill competence is essential for community participation (Gresham, 1981) and general quality of life (Guralnick, 2000) in school and throughout adulthood and is of primary importance to parents (Hamre-Nietupski, Nietupski, & Strathe, 1992) and teachers alike (Baumgart, Filler, & Askvig, 1991). The need for interventions to address social skills deficits has not gone unnoticed (e.g., Bellini & Akullian, 2007; Guralnick, Connor, Neville, & Hammond, 2006). Peer-mediated intervention (PMI) and video modeling (VM) are two interventions that have been demonstrated to be effective with children with disabilities (S. Wang, Chui, & Parilla, 2011). Both incorporate the use of models and imitation and reflect principles of social learning theory as described in Bandura and Walters (1963).

PMI

PMI involves trained peers of similar age delivering instruction to a targeted individual (Chang & Locke, 2016). During instruction, peers model, prompt, and reinforce appropriate behaviors (Rogers, 2000). Use of PMI holds an advantage over adult modeling in that the target behaviors are demonstrated by peers and embedded within the instructional process. PMI has been demonstrated to be an effective method to teach social skills to preschool-aged children with autism (Garfinkle & Schwartz, 2002; Odom & Strain, 1986), older children and adolescents with autism (Chang & Locke, 2016; Kamps, Potucek, Lopez, Kravits, & Kemmerer, 1997), and adolescents diagnosed with intellectual disabilities (Asmus et al., 2017; Haring & Breen, 1992).

Peer networking (PN), a type of PMI, consists of a group or network of peers who prompt, model, encourage, and reinforce socially appropriate behaviors (Kamps et al., 1997; Utley, Mortweet, & Greenwood, 1997). Adults may train the peers but do not participate in the delivery of the intervention unless needed (Utley et al., 1997). Numerous studies have demonstrated the positive effects of PN with both young children and adolescents diagnosed with autism (Garrison-Harrell, Kamps, & Kravits, 1997; Kamps et al., 2014, 2015; Mason et al., 2014; McFadden, Kamps, & Heitzman-Powell, 2014) as well as

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Effects of a Robot Peer on the Acquisition and Observational Learning of Sight Words in Young Adults With Autism Spectrum Disorder

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Abstract

The authors of the current investigation developed and evaluated the effects of a tutoring system based on a small-group arrangement to two young adults with autism spectrum disorder on the acquisition, maintenance, and generalization of sight words. The tutoring system was comprised of a virtual teacher to instruct sight words, and a humanoid robot which adopted a peer metaphor, where its function was to act as an emulated peer. With the introduction of the robot peer (RP), the traditional dyadic interaction in tutoring systems was augmented to a novel triadic interaction in order to enrich the social content of the learning environment and to facilitate observational learning (OL). The virtual teacher implemented a constant time delay strategy to instruct three types of sight words: (a) target words exclusive to the participant, (b) target words common between the participant and the RP, and (c) nontarget words exclusive to the RP. In order to examine the efficacy of intervention, a multiple-probe design across three word sets, replicated across two participants, was utilized. Results indicated that both participants acquired, generalized, and maintained target words with 100% accuracy. Furthermore, the participants made fewer errors and required less instruction time to learn the words common between the participants and the RP. Finally, the participants acquired, through OL, the majority of words taught exclusively to the RP.

Keywords

autism, observational learning, computer-assisted instruction, robot technology, small-group instruction, triadic interaction, constant time delay

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by ongoing problems in social interaction and communication and engagement in repetitive behaviors. According to Centers for Disease Control and Prevention, an estimated 1 in the 68 children in the United States has ASD (American Psychiatric Association, 2013). Many individuals with ASD have difficulties learning to read and often fail to acquire phonemic awareness and decoding skills (Gabig, 2010; Vacca, 2007). As a result, they must rely on the identification of whole words, referred to as sight words, to read print within their environments. The acquisition of sight words can increase their fluency and confidence when learning decoding strategies (Browder & Lalli, 1991; Nist & Joseph, 2008) and can also help them with independent daily and vocational tasks as well as navigating their environments through quick identification of words.

Individuals with ASD receive intervention in a variety of arrangements. One of the most common is direct instruction from an adult in a highly-structured format delivered in a 1:1 arrangement (Collins, Gast, Ault, & Wolery, 1991; Lovaas & Smith, 2003; Stahmer, Collings, & Palinkas, 2005). In the direct 1:1 arrangement, the instructor uses prompting strategies and differential reinforcement to teach carefully selected target behaviors (Duker, Didden, & Sigafoos, 2004). The benefits of this type of instructional format regarding skill development of children with ASD are well-documented. In 1:1 arrangement, learning opportunities are focused on the target child, and teacher's undivided attention minimizes distracting stimuli and facilitates the acquisition of stimulus control by potentially reducing overselective responding that has been observed in children with ASD (Lovaas, Koegel, & Schreibman, 1979). In addition, for a successful implementation, this arrangement requires minimal prerequisite skills from the child (Lovaas & Smith, 2003;

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