Improving Employee Handbook Comprehension for College Students with Intellectual Disability

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Abstract

Independent access to text is important to employment and critical for postsecondary success; however, literacy deficits make access to text challenging for individuals with intellectual disability (ID). Limited access to employment policies and procedures leaves many at a disadvantage. This single-case research design study examines the text comprehension of employee policies and procedures for four college students with ID through a universally designed employee handbook, graphic organizers, and systematic instruction. Results indicate that participants improved in text comprehension and independent navigation of accessibility functions on iPads, an important skill in a technology-based culture. Recommendations and implications for practice and further research are also discussed.

Keywords: postsecondary education, intellectual disability, shared stories, technology, employability skills

Plain Language Summary

Help with Understanding Job Policies for People with Intellectual Disability
- It is important that employees know workplace rules.
- Employee handbooks list the rules of a job and workplace. Employee handbooks can be hard to read.
- You could lose your job if you do not understand the policies and procedures at your work.
- **What we did in this study:** This study looks at how to make job rules easier to understand, especially for people who are not strong readers.
- We used a universally designed employee handbook on an iPad®. This means we included pictures and plain language.
- We also used the read aloud tool for the text.

- We taught participants to use graphic organizers to help answer questions. When they got an answer wrong, we taught them how to go back and listen to the information again.
- **Findings:** By the end of the study, all four students were able to get better at answering questions about the job rules.
- They also learned how to use an iPad® read aloud tool.
- **Conclusion:** More research is needed. But we recommend that employers use plain language in employee handbooks.
- Employee handbooks should also be accessible.

The Workforce Innovation Opportunity Act (WIOA) 2014 established a national precedent for preparing students with intellectual disability (ID) for competitive, integrated employment. However, individuals with ID are still at significant risk for higher unemployment or underemployment rates, lower pay, and fewer benefits (Siperstein et al., 2013). As we head into the ongoing economic tumult resulting from the worldwide pandemic, employment recovery for this group may be slowed even more. The shutdown surrounding the pandemic also led to most workplaces adopting increased digital tools, online meetings and file sharing, and some distance-based or flexible work arrangements (Casselman, 2021). This leads to greater competition between members of the workforce who can independently access and understand workplace policies and procedures—oftentimes provided in a virtual setting—and a need for high-quality education and employment preparation for those with disabilities so that they are competitive.

The Individuals with Disabilities Education Act (IDEA, 2004) requires educators to prepare students for successful employment through the design and implementation of student-centered transition-focused Individualized Education Programs. This preparation covers multiple skill areas, including literacy, a functional skill that is critical for successful employment in most situations (Conceição, 2016). A challenge to the transition process is that individuals with ID often demonstrate extremely low literacy levels (Katims, 2000); therefore, young adults with ID may have limited access to and lack awareness of the important information included in workplace texts such as employee handbooks, which increases barriers to acquiring and maintaining financially secure employment (Wagner et al., 2006). This may be exacerbated by limited access to coworkers and hands-on training due to COVID-19 restrictions, leaving individuals who need to access important workplace information using multiple modalities on their own and at a disadvantage. Workplace literacy training, technology training, and more accessible workplace texts are needed for transition-age students with ID to improve their chances of employment success.

Literacy Skill Instruction

Transition planning should include successful instructional strategies to increase the functional literacy skills related to employment for students with disabilities to provide greater access to independence. Research supports the use of systematic instruction to teach comprehensive literacy skills to students with ID (Allor et al., 2010; Hudson & Test, 2011); however, much of the research focuses more on academics instead of employment. For example, the use of shared stories (i.e., accessing age-appropriate literature with

teacher-student interaction) combined with systematic instruction has a moderate to strong evidence base to support access to text and improving comprehension and vocabulary skills of elementary and middle school students with ID who have moderate to significant support needs (Browder et al., 2015; Hudson & Test, 2011; Mims et al., 2012). Shurr and Taber-Doughty (2017) taught four high school students with ID to correctly respond to comprehension questions and perform story retells on age-appropriate texts using read-alouds and visual supports. Similarly, Kemp-Inman (2016) used shared stories, explicit instruction, graphic organizers, and a rereading strategy to build the text comprehension skills of three high school students with ID. Research continues to demonstrate that the literacy skills of young adults with ID can improve if given appropriate instruction, such as shared stories.

A key component of shared story interventions is adaptation of the text. Coyne et al. (2012) and Rivera et al. (2013) combined the use of portable technology with adapted shared stories to deliver engaging literacy instruction for students with ID. Adapted multimedia shared stories incorporating systematic instruction have been used to increase comprehension and engagement with age-appropriate texts for students with moderate to significant support needs in elementary (Spooner et al., 2014), middle school (Mims et al., 2018), high school (Knight et al., 2018), and college settings (Devine et al., 2018).

Increasing opportunity for independence for individuals with ID may be done through maximizing the flexibility found in portable electronic devices, such as tablets and smartphones (Kagohara et al., 2013). For example, word prediction and text-to-speech tools can be used to improve writing skills (Silió & Barbetta, 2010). Speech-to-text tools can support understanding of a class lecture, leading to improved reading comprehension and increased preparation for exams (Shadiev et al., 2014). Uploading video sequences, picture checklists, overall task lists, and reminders into personal electronic devices allows individuals to independently navigate their school, employment setting, or independent living task (Kagohara et al., 2013). Skill instruction using technology may improve access to employment opportunities and increase independence for young adults with ID.

Employee Handbooks

There are four main purposes for employee handbooks: communication, planning, management, and legal protection (Guerin & DelPo, 2017). The U.S. Small Business Administration (n.d.) states that employee handbooks should be designed to protect the legal rights of employers and employees as well as provide a thorough understanding of the primary procedures and policies of a business. Employee handbooks usually include the required postings of the U.S. Department of Labor as well as safety policies and essential procedures for the business. An employee handbook is a way of ensuring distribution of essential information to all employees. Employees have decreased chances of success on the job without an understanding of workplace policies and procedures (Pedersen, 2008).

For transition-aged individuals with ID, having inadequate access to text can lead to decreased overall independence; therefore, building higher levels of text comprehension, particularly as it relates to employment requirements, is essential for academic and

employment success and to increase independence. To this end, the purpose of this study was to examine the effects of a multimedia shared story (i.e., the adapted employee handbook) using text-to-speech technology on the text comprehension skills of college students with moderate ID. The focus of this study was to answer the following research questions: (a) Does the application of a multimedia literacy instructional package improve the text comprehension of an adapted employee handbook for college students with ID? (b) Does the instructional package improve related employment task completion? (c) What are the student and stakeholders' perspectives on the use of the multimedia adapted employee handbook?

Method

Design

A single-case multiple-probe across conditions and participants design (Horner & Baer, 1978) was used to analyze the effects of a literacy instructional package, including a text-to-speech function, graphic organizer, rereading strategy, and systematic prompting, on text comprehension across sections of an adapted employee handbook accessed via an iPad Air. This design provided the opportunity to demonstrate a functional relation between the literacy package and text comprehension by allowing for an evaluation of the immediate change between baseline probe condition and performance after application of the intervention. The use of a multiple-probe design allowed evaluation of the systematic prompting procedures for error correction and the use of the graphic organizer because participants were not as likely to learn and use those strategies and tools without implementation of the intervention. Use of multiple probe procedures avoided assessing repetitive baseline condition data that were not likely to change, thus preventing boredom and/or frustration in the participants and controlling for testing effects that may have threatened internal validity (Gast et al., 2014).

Participants

Study participants included four college students enrolled in an inclusive postsecondary education (IPSE) program for individuals with ID and developmental disability. Participants met the following inclusion criteria: (a) the student was enrolled in the IPSE program, (b) had a diagnosis of ID per past documentation (i.e., psychological or IEP) or parent and/or student disclosure, (c) scored at or below third grade levels of reading comprehension on the *Informal Reading Inventory* (Roe & Burns, 2002), (d) demonstrated physical ability to access the iPad application, (e) was available to participate in intervention at least two days per week, (f) was interested in working at the university preschool (the employee manual used for this study), and (g) signed consent to participate that was approved by the IRB. All participants were over 18 years of age and were under their own legal guardianship. All participants were given pseudonyms for discussion in this text.

As part of the recruitment criteria, the *Informal Reading Inventory* (Roe & Burns, 2002) was given to each participant. All participants scored at the preprimer level for reading and listening comprehension. In addition, as part of entry into the IPSE program, each

participant had been given a personal support inventory adapted from the Assessment of Functional Living Skills assessment (Partington & Mueller, 2012) completed with a parent. This inventory used a Likert scale to explain the amount of support needed on the adaptive behaviors of (a) eating and food preparation, (b) grooming and dressing, (c) hygiene and toileting, (d) sexuality, health, and safety, (e) general health concerns, (f) awareness of home hazards and emergency procedures, (g) household maintenance, (h) travel and mobility, (i) general shopping, (j) social skills, and (k) overall planning/scheduling. Individual deficits in adaptive behavior per self/family report are summarized for each participant below.

Nancy

Nancy was a 27-year-old, White, female student with Down syndrome in her second year in the IPSE certification program. Her past psychological reports noted that she also had hypothyroidism, myopia, hearing loss, and was legally blind. Due to her significant visual impairment, all materials were individualized using a 30-point font size. Nancy is verbal but had an overall difficulty in receptive and expressive language skills and had formal evaluations conducted on the Peabody Picture Vocabulary Test (4th ed.), Expressive Vocabulary Test (2nd ed.), and Clinical Evaluation of Language Fundamentals (4th ed.). Her percentile rank for all assessments ranged from 0.1% to 2%. Similar results across academic skills (e.g., math and writing) on the Woodcock Johnson III also showed Nancy's academic level at 1st to 2nd grade. Her *Informal Reading Inventory* results demonstrated challenges with answering "wh" questions (35% correct at preprimer and primer levels). Although Nancy did have deficits in academic behaviors, her personal support inventory showed she was independent on most skills. The inventory did note that she needed support using the oven for food preparation and assistance with riding/navigating the city bus system. Her postsecondary goals included working with children in a preschool setting, but she did not work within the preschool before or during this study.

Kate

Kate was a 25-year-old, White, female student in her first year in the IPSE program. Kate had Kabuki syndrome, scoliosis, cleft palate, and hip dysplasia, per family report. Kate was provided special education services until the age of 22 under the IDEA eligibility criteria of ID. Kate was in a prevocational program during her last years of special education services and had always expressed a desire to work in a preschool setting. Before entering the IPSE program, Kate had a few months of experience in a different preschool than the one used for this study but had not witnessed the performance tasks assessed within this study. Kate was verbal but had deficits in some fine motor skills due to a limited range of motion from rods in her back to address the scoliosis. She could access the iPad but struggled with the double-tap used to make selections on the touch screen so was given an additional accessibility accommodation on the iPad. *Informal Reading Inventory* results show that Kate recognized words at a level 1 but scored below preprimer when asked comprehension questions. She averaged 55% accuracy in answering "wh" questions after listening to a text read aloud at Level 1 and 38% accuracy when she read the text independently (across preprimer and primer level passages). The

personal support inventory noted that Kate required moderate support for food preparation and some hygiene assistance (e.g., shaving, washing hair) due to her physical disability.

Beth

Beth was an 18-year-old, African American, female student in her first year in the IPSE program. Per family report, Beth was diagnosed with ID due to the loss of oxygen at birth. Beth attended a private high school in a classroom designed for young adults with developmental disabilities. Since she attended a private school, the family did not have any past psychological or IEP data. Beth was interested in gaining work experience at the university preschool and expressed an interest in "young kid teacher helper" as a career goal; however, she had not yet worked at this preschool prior to or during the study. The personal support inventory showed that Beth did not have any deficits in using technology, vision, verbal, or fine motor skills. The inventory did show that Beth required additional support in hygiene (e.g., shaving, shampooing hair), social skills (e.g., basic greetings), and sexuality awareness (e.g., awareness of strangers). More intensive support needs were noted for using services (e.g., doctor, laundry) and planning and scheduling (e.g., asking for help, budgeting, transportation). Her *Informal Reading In*ventory results showed that her word recognition skills ranked at a level 1, but her overall independent reading and listening comprehension skills were at the preprimer level. She averaged 52% accuracy answering "wh" questions across both independent (primer level) and listening (Level 1) assessments.

Olivia

Olivia was a 21-year-old, African American, female student with Down syndrome in her first year of the IPSE program. Olivia had recently moved to the city and had finished receiving special education services from another state. Olivia was verbal, although occasionally difficult to understand and repetitive in her expressive language. She enjoyed playing the piano and watching dance videos. She was only on campus two days per week for the duration of this study. One of Olivia's postsecondary goals was to work with children, but she had not worked at the university preschool before or during the study. The personal support inventory showed that Olivia needed moderate support on most items. More intensive or complete support was noted for grooming, sex awareness, household maintenance, some hygiene, and planning and scheduling. The results of Olivia's *Informal Reading Inventory* demonstrated a strong word recognition skill (Level 5), but difficulty with answering comprehension questions (preprimer independent reading, primer for listening comprehension). She averaged 64% accuracy in answering "wh" questions during independent reading at a preprimer and primer level and 71% during listening comprehension assessment at Level 1.

Researchers

The researchers were two full-time doctoral students in special education, both former teachers of transition-aged students with ID. The primary interventionist (first author) led 75% of the sessions across participants. Prior to beginning any sessions, the second

researcher (a special education doctoral student) who delivered the remaining 25% of intervention sessions was trained in the procedures and implementation of the intervention until he demonstrated three consecutive sessions of 100% accuracy in delivering the baseline and intervention procedures using the intervention procedures checklist. Two special education doctoral students familiar with the procedures of the study collected procedural fidelity and reliability data.

Setting

The reading sessions took place in the conference room/breakroom of the preschool building located on a university campus in the southwestern United States. The room was an extra space used for one-on-one tutoring, employee breaks, and parent and employee meetings. The room was approximately 10 ft. by 20 ft. with a large conference table and chairs. Windows lined one wall. Another wall included cabinets and a computer with a projector. The wall separating the hallway from the room was glass, but the hallway was very quiet. There were rarely any passersby during sessions. A participant was seated at the conference table next to the researcher and given the iPad. During procedural fidelity and inter-rater evaluated sessions, an observer sat across the table from the participant.

Materials

Throughout baseline and intervention phases, participants had access to an *iBooks* version of the adapted employee handbook, which was developed using the *iBooks* Author (2013) software and then displayed on an iPad Air. Performance task supplies, including access to the preschool phone system and a nearby sink with soap and towels, were also available. During intervention, participants were given two hard-copy, picture-based graphic organizers for support; one organizer included the steps to activating the VoiceOver accessibility tool on the iPad Air and the other, which was adapted from Mims et al. (2012), was a guide for answering "wh" questions.

The adapted handbook was designed using relevant handbook sections chosen by the employer. Text adaptations and multiple-choice questions were developed by the researcher and verified for content and consistency by an expert panel consisting of the employer and two assistant professors who specialized in teaching students with ID and developmental disability. Text passages were adapted from the original university preschool employee handbook to a 200 to 500 Lexile range. This range fell within the independent reading level of the participants per The Lexile Framework for Reading website (www.lexile.com) and the recommendations of Browder et al. (2007) for adapting texts for students with ID. A free Lexile Analyzer tool located on the Lexile.com website was used to evaluate ranges for each page of text.

The text was also designed to incorporate the principles of Universal Design for Learning (UDL; Rose & Meyer, 2002) and Mayer's (2009) recommendations for effective multimedia learning (e.g., reducing extraneous processing, managing essential processing, and fostering generative processing). Multiple means of representation, one of the principles of UDL, was incorporated by adding relevant pictures to each page, using the VoiceOver accessibility tool to read the text aloud, reducing reading difficulty of the

text, enlarging font size of the text, and embedding comprehension questions throughout using the *iBooks* interactive quiz feature.

Dependent Variable(s)

A total of five literal comprehension questions associated with a "wh" word (e.g., who, what, where, when, why) were included in each section of the handbook. The questions were developed following the recommendations of Browder et al. (2011) for comprehension question vocabulary for individuals with moderate and severe disabilities and consisted of five questions related to the specific employment. After reading the text, each participant was asked the question for its section. The total number of questions answered correctly were added up for each session and graphed (see Figure 1). An iPad Air was used to deliver the text. A total of nine versions of the handbook sections were created (three versions for each section). Within each section, page orders and answer selection orders were shuffled to reduce memorization of the order.

In addition, a single performance task was measured using permanent product recording. The performance task asked the student to independently perform all steps of the task (i.e., use of intercom, handwashing, stating safety rules). If the student did not perform each step of the task correctly, the task was recorded as incorrect. No prompting or error correction was given during the performance task.

Independent Variable(s)

The independent variable for this intervention was an instructional package that included (a) systematic instruction for answering comprehension questions, with error correction and rereading procedures, (b) instruction and prompting to use the graphic organizers, and (c) using the built-in text-to-speech tool on the iPad called VoiceOver. When the participant had an incorrect answer during intervention, least-to-most prompting encouraged the use of the "wh" question graphic organizer and a rereading procedure to obtain the correct answer. Least-to-most prompting, a more naturalistic way to transfer stimulus from the experimenter's prompts to the natural environmental stimulus (Cooper et al., 2007), has been demonstrated as an effective method for teaching individuals with ID to use electronic devices (Kagohara et al., 2013).

Baseline

All participants were assessed for baseline across six consecutive sessions to provide an opportunity to demonstrate stable baselines and establish experimental control (Gast et al., 2014). Prior to a session, a version of one of the three handbook sections was randomly selected. Then the participant was seated at the conference table, given the unlocked iPad, and prompted to "Please open the Preschool Employee Handbook and I will begin reading. Answer each question the best you can and then go to the next page. We will follow these steps until you reach the end of the book." After the verbal prompt, the participant had 10 seconds to open the text. If the student responded incorrectly or failed to respond, the instructor completed the steps necessary to open the appropriate book and page. The instructor then began the reading. At the end of the page, the

instructor verbally prompted with "Swipe to the next page." One page of the adapted handbook was followed by a multiple-choice question, which was read aloud by the researcher. At each question, the participant was given 10 seconds to answer. If no response was given within 10 seconds, the participant was verbally prompted to select an answer. All participants responded at this point of baseline. No further prompting was needed.

After completing the five pages of text and accompanying five multiple-choice questions for that session, the student was given a verbal prompt to complete a performance task related to the reading (e.g., "Use the intercom to call the office."). The only prompt given was that the student could "refer back to the handbook" for any help they might need. At each student pause in the task, the instructor verbally prompted with "Are you finished?" If the student said, "yes," then the session ended. If the participant said, "no," then the instructor gave the participant another 10 seconds. No error correction procedures or prompts were given for steps completed incorrectly and the handbook section was only completed once per session. Baseline sessions averaged 8 minutes with a range of 8 to 13.

Intervention

The participant with the most consistent and stable baseline data entered initial intervention first. Intervention included one session per day, with two to four sessions per week, depending on participant availability. Individual sessions included one attempt of the handbook section. To avoid response memorization and to focus on assessing text comprehension, sessions were limited to three sessions per handbook section. In each section, there were three varieties of question order. Each section was randomly assigned. During the third intervention session for one section, a baseline probe was taken for the next section. Total intervention spanned 10 weeks over the fall semester, including the Thanksgiving holiday week.

During intervention, the participant was seated at the conference table with the iPad Air and printed copies of the graphic organizers were placed nearby. Before beginning intervention, the participant was taught to turn on the text-to-speech feature of the iPad. Once the participant demonstrated 100% mastery of this step over three consecutive sessions, intervention began. One participant, Kate, did not have the fine motor skills to make the selections without frustration. During subsequent intervention sessions, the Assistive Touch accessibility tool was implemented for her instead of just the text-to-speech tool (VoiceOver). This allowed her to still hear the text read aloud, but she only had to touch the screen once to make a selection, rather than the multiple, specifically timed taps needed to make a selection in VoiceOver mode.

At the start of the session, the interventionist reviewed the purpose and content of each graphic organizer as well as the process of checking answers and swiping back to the previous page to review the text. The instructor then gave a verbal prompt to start the read-aloud component on the iPad. A 10-second time delay was used between each prompt to ensure that participants had plenty of time to process the instruction and attempt the task or step. If the student did not respond or begin the step within 10 seconds of initial

prompt, a system of least-to-most prompts was used to begin the read-aloud. If the participant did not respond to the comprehension question within 10 seconds of the answers being read, a verbal prompt was given. Similar to procedures delineated in Mims et al. (2012), if the question was answered incorrectly, the instructor prompted with "No, that isn't correct." Then the instructor drew the participant's attention to the "wh" graphic organizer. The researcher would say, "Remember, Wh__ (-o, -ere, -at) questions are looking for a _____ (person, place, thing). Let's go back and listen again." Then the instructor prompted the participant to listen to the previous page. If an incorrect or no response was given to that step, the instructor stated, "No, remember, we need to swipe back to the previous page and read it again." If the participant answered incorrectly a second time, the previous step was repeated but only the correct section was read aloud. If an incorrect or no response was given during the third attempt, the instructor would swipe back to the previous page, point to the answer in the text, and read it aloud. Then the instructor would swipe back to the multiple-choice question and model the correct answer. "The answer is _____. Your turn. You point to _____." Then the instructor verbally prompted the participant to move to the next page.

After reviewing the section of text and answering the comprehension question related to the content of that page, the student participants were asked to perform a related task. Correct responses were recorded if each step listed in the text was performed. Verbal praise for participation was given at the end of the session. Just like baseline, the instructor gave a verbal reminder to the participant after the performance task instruction was read aloud that she could look back through the text to help complete the task. If the student began the task but completed a step incorrectly, no error correction took place. Data were collected on correct and incorrect steps over the total task. If the participant stopped working on the task before all the steps were completed, the instructor waited 10 seconds for her to resume. If no response occurred, the instructor asked, "Are you finished?" If the participant indicated that she was finished, the session was ended. If the participant responded with "no," the instructor gave the participant another 10 seconds to move to the next step. All participants followed procedures appropriately and did not need reminders to stay on task. Intervention sessions averaged 17 minutes (mean = 17.16, range = 11-28).

Maintenance

Maintenance probes for each handbook section were taken once a week after intervention was completed. Sessions averaged 10 minutes in length (range = 8-20) and consisted of a run-through of one randomly selected handbook section. Participants could use the text-to-speech function of the iPad and had access to the graphic organizers as in the intervention phase, but they did not receive prompting to open and use the text-to-speech tool or the organizers. No error correction was provided during this phase. As many maintenance probes as possible were taken before the semester ended.

Results

Each study participant completed baseline, three phases of intervention, and a maintenance phase. Mean length of sessions across phases was 11.84 minutes (range

= 6-28). Data were collected for a total of 105 sessions across the four participants during 10 weeks of the fall semester. Figure 1 shows results of the number of correct responses to the comprehension and performance task questions for each phase. Level, trend, variability, immediacy of effect, and data consistency between and within phases were reviewed (Kratochwill et al., 2010). Tau-U statistics were calculated for the overall baseline and intervention phase contrast using the Web-based Tau-U calculator found on singlecaseresearch.org (Vannest et al., 2011). The purpose of the Tau-U is to calculate the effect size to provide an additional effect measure for the study (Parker et al., 2010).

Comprehension Questions and Performance Tasks

For every correct unprompted response to the comprehension questions, one point was scored per participant. A session included a possible 5 points for comprehension questions based on information provided in the text. Means and standard deviations for the comprehension questions are shown in Table 1. Following the set of comprehension questions, the participants were asked to complete a performance task related to information found in that section of the handbook. Percentages of steps performed correctly for each task across phases are reported in Table 2.

Nancy

Nancy's data revealed an increase in correct unprompted responses to the comprehension questions during intervention (M = 3.22) compared to baseline (M = 1.17). She demonstrated an accelerating trend in each handbook section with an overall relative change in level from baseline to intervention (3 to 5). Nancy's scores were variable for baseline and intervention phases but stabilized during maintenance, with an immediacy of effect noted between baseline and section one intervention. During maintenance, Nancy achieved a higher level than baseline and intervention (M = 4.11). Baseline scores for Nancy were somewhat variable, so there was overlap between the data in baseline and intervention. Her steps performed correctly for the performance task analysis increased from 32% at baseline to 74% in intervention and maintenance phases. A Tau-U effect size for Nancy was calculated at 0.79, p = 0.01, indicating a strong change from baseline to intervention, however the effect size calculation must be considered in conjunction with visual analysis.

Kate

Kate demonstrated improvements in level between baseline (M = 2.14) and intervention (M = 3.33) with a slight drop in the maintenance phase (M = 3.00) on her unprompted correct responses to the comprehension questions. Her scores were somewhat variable in each phase but reached stability for handbook section two during maintenance. No immediacy of effect between baseline and intervention was noted, although accelerating trends were reflected in handbook sections two and three. Her data remained stable during maintenance. Because of the variability and high level in Kate's baseline scores, there was significant overlap in the data between baseline and intervention. Tau-U was calculated, after baseline trend correction, at 0.60, p = 0.04, which would be considered a moderate to large effect. Again, the Tau-U must be considered along with the results of

visual analysis. Her baseline percentage of steps correct for the performance tasks started out high in baseline at 62%; however, she did improve to 77% during the intervention phase with a slight drop to 74% in maintenance.

Beth

Beth's data revealed a steady increase in correct responses to the correct unprompted comprehension questions from baseline (M = 2.75), intervention (M = 3.89), to maintenance (M = 5.00). Her baseline scores stabilized during the final five sessions. Data reflected an accelerating trend in each handbook section, with the strongest in section three (relative level change = 2 to 5). Beth's scores were lowest during section two of the handbook, which was the final section she completed. This led to an overall decelerating trend during intervention. No immediacy of effect was noted between baseline and intervention, although correct responses improved by the final session of each handbook section. Due to variability and high baseline scores, there was significant overlap of scores between baseline and intervention. Her scores were stable during the maintenance phase. A Tau-U effect size was calculated at 0.54, p = 0.05, which would be considered a moderate effect for the effect size score, but this must be taken into consideration along with the results of the visual analysis. During the performance tasks, Beth completed 39% of steps correct during baseline, increasing to 74% in intervention and 89% in maintenance phases. She was the only student to master the Intercom performance task.

Olivia

A slight increase in the level of correct unprompted responses to comprehension questions was noted for Olivia between baseline (M = 3.25), intervention (M = 4), and maintenance (M = 4.25). Baseline data were somewhat variable; however, a slight accelerating trend was noted during intervention. No immediacy of effect was noted between baseline and intervention phases. Only one session of maintenance data for handbook sections two and three was obtained (two for section one) because the semester ended. Because of the variability of the data and the minor increase in scores during intervention, there was a significant overlap of the data between baseline and intervention phases. The Tau-U for Olivia totaled 0.44, p = 0.12, indicating a low to moderate effect but without significance. This Tau-U score aligns with the results of the visual analysis. Olivia demonstrated significant challenges with the performance tasks, with little to no change across baseline (45%), intervention (41%), and maintenance (44%) phases.

Employment Performance Task

Each section of the handbook included an employment task based on information provided in the text. Correct responses to this task were measured by the participant completing each step of the task as listed in the handbook. No error correction procedure was used during the performance tasks. Participants were given a verbal reminder to look in the text for help if needed. Table 2 reflects the percentage of steps completed correctly during each phase. Only one student, Beth, was able to complete the Intercom task

correctly by the maintenance phase. It is also important to note that she was the only participant who did look back at the text during a performance task to check the steps she needed to follow. The remaining participants did not remember to dial the room number. All participants were able to correctly complete three of the four steps in the hand-washing task. The step that all participants struggled with was "sing the ABCs." This step was important for the students to complete because they were modeling that step for the preschool students; however, the participants did not perform this step. Two of the four participants (Nancy and Kate) reached 100% accuracy on the Safety Rules task. Beth reached 100% by the maintenance phase. Olivia struggled with this task, and instead kept responding to this prompt with jobs related to safety (e.g., police or fireman).

Interrater Reliability and Procedural Fidelity

Procedural fidelity and reliability data were collected during 30% of baseline, 36% of intervention, and 67% of maintenance conditions. Procedural fidelity data were collected using a procedural checklist. The number of correct unprompted responses to the comprehension questions and the performance task were recorded by the second observer and then compared to the responses saved on the iPad Air and the recordings of the researcher. Results were reviewed following each session. Reliability data were calculated by taking the total number of agreements between the two scorers and then subtracting from the total number of agreements plus disagreements. The result was multiplied by 100 to obtain a total percentage of agreements. Interrater reliability results were 100% during all phases. Procedural fidelity was calculated by subtracting the number of steps completed correctly by the interventionist from the total number of correct and incorrect steps and then multiplied by 100. The resulting rate of procedural fidelity was 100%.

Social Validity

The results of a post-intervention survey demonstrated that the participants agreed or strongly agreed that they learned to use the tools in the intervention and that they enjoyed learning more about the job. The IPSE program director and preschool director (employer) both agreed or strongly agreed that the intervention was easy to follow and inexpensive to implement, that the participants gained important skills, and that they would recommend this intervention to others. This is important to relay when working with employers who may not understand the need for accessible workplace texts. A review of field observations revealed that although participants struggled to generalize the skills from text to implementation without prompting, they were interested in the learning process and appeared to enjoy the positive feedback they received.

Discussion

The purpose of this study was to determine the effects of a multimedia adapted employee handbook using text-to-speech technology on the text comprehension of college students with ID and very low independent reading levels. The instructional package extended the work of Devine et al. (2018) and Mims et al. (2012) and included the use of three of the

seven National Reading Panel (2000) recommended methods to teach comprehension: (a) comprehension monitoring, (b) using a graphic organizer, and (c) question-answering with immediate feedback. All participants made gains in correct responses as well as in their ability to independently use the VoiceOver accessibility tool in the device. Because employment rates for individuals with disabilities are lower than 25%, and barriers to that employment are consistently found in the characteristics of the job and limited opportunities to develop employment skills (Adams et al., 2019), individuals with IDD need workplace support they can manage independently. The findings suggest a possible functional relationship between the multimedia instructional package and the number of unprompted correct responses to text comprehension questions for three of the four participants. This supports the research of Baker et al. (2018) that employers and academic researchers can and should work together to improve employment success for individuals with IDD. A functional relationship between the instructional package and the number of correctly completed performance tasks as a whole was not found. However, when broken down by handbook section, a functional relationship was found between baseline and intervention for the section three performance task (i.e., the three Safety Rules).

Multimedia Instructional Package

The results of using the multicomponent literacy instructional package incorporated in this study can be compared to similar studies used to improve the text comprehension skills of middle school students with significant support needs (Mims et al., 2012), literacy skills of elementary students with ID (Allor et al., 2010), and text comprehension of high school students with ID (Kemp-Inman, 2016; Shurr & Taber-Doughty, 2017). These findings are also consistent with research on shared stories, and extends the research by including college-age student participants and implementing a multimedia component (text-to-speech) and employment task based on the text. In addition, the results of this study extend previous research on the use of handheld technology devices to improve access and engagement to age-appropriate texts for youth with ID and developmental disability (Rivera et al., 2013; Spooner et al., 2014), use of best practice in multimedia instruction (Mayer, 2009), and incorporation of UDL in the design of the text (Rose & Meyer, 2002). Even further, the results of this study may be essential in small-business settings where employees may not have access to corporate created video or UDL-based training.

Limitations and Future Research

This study led to promising results, but there are limitations to consider for future research. Variability of baseline data may be due to the fact that evidence-based practices were being used for the baseline phase (e.g., read-aloud and adapted text) that potentially led to stronger levels of initial comprehension. Also, only one data point of baseline was collected immediately before intervention for the next phase, and sometimes considerable time had elapsed between initial baseline collection and that specific handbook section intervention phase. This was done to avoid overexposure to the text and time concerns, but additional research should include a longer return to baseline conditions to establish a trend. Additionally, only three data points were collected for each intervention phase. Again, this was done to avoid overexposure to the text as well as limitations in time, but

future studies should include trials to mastery for each section as well as varied comprehension questions. The handbook sections were designed to be very similar in formatting and difficulty, so although they are delineated as separate sections, the collective result could be viewed as 9 data points of intervention per person.

The process of text adaptation and type of text used is also a concern. Measures were taken to ensure that the adaptation was consistently applied, and the potential employer considered understanding of the handbook as essential to employment success; however, future research should ensure that texts used are important to the participant and his or her future goals. A deeper analysis of the comprehension questions themselves (e.g., percentage correct of each type of "wh" question) would be extremely beneficial as well, as this may help recognize individual participant error patterns. This information would be an important addition to the work of Morgan et al. (2009), who noted that individuals with ID struggled with comprehending certain "wh" question words more than others and may need more explicit instruction and support on the meanings of specific types of question words. Because results of the performance task were mixed and because translating text to practice is sometimes difficult, future research should also include additional support such as video modeling or error correction procedures. Future research should also parse out the various components of this multi-instructional package to determine the effect of each component.

A final limitation included technology concerns and issues that arose throughout the study. Although the use of the built-in accessibility tool, Voiceover, was purposeful for the sake of generalizability, this tool added some anomalies to the study process. Turning on the text-to-speech tool made it significantly harder to navigate the handbook pages. Also, there were times when the tablet would shut down and take the user out of the application. The benefit of this challenge was that all of the participants learned how to troubleshoot and get back into the appropriate text on their own. Based on this finding, future research on independent problem solving of technology concerns in real-world settings should be considered.

Implications for Practice

The results of this study support the idea that practitioners should provide systematic instruction and evidence-based practices to build the text comprehension skills, and practical application of that comprehension, for young adults with ID. These skills should be introduced and supported by teachers from an early age to improve chances of text independence by the time these individuals are seeking postsecondary education and/or employment. Multimedia instructional packages, including the use of shared stories or read-alouds, visual supports, and systematic prompting should be included in instructional plans and text adaptations as well. As noted by the low performance task levels in this study, further explicit instruction is needed for application of tasks within a text. The addition of a video modeling component may be appropriate. Postsecondary education programs have the advantage of working closely with small-business employers to aid in developing handbooks and other important employment information using a UDL approach to support understanding for a diverse set of employees, thus increasing access to essential workplace policies and procedures for *all* employees.

Conclusion

The ability to independently access text, especially text that contains information critical to employment success, is an important skill for postsecondary achievement (Alwell & Cobb, 2009). Access to texts may be challenging for individuals with ID because of deficits in reading. However, in this study, four college-students with ID were able to demonstrate consistent understanding of important employment policies and procedures through the use of a UDL-designed employee handbook, graphic organizers, and systematic instruction. They were also able to learn how to independently navigate and troubleshoot the text-to-speech tool found in iPads, a critical skill for independence in our technology-based culture. Research projects such as this extend the knowledge base for promoting independence and accessible real-world texts for individuals with ID.

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Table 1

Mean Number and Standard Deviation of Correct Unprompted Comprehension Question Responses Across Study Phases

Participant/ Handbook Section	Baseline		Intervention		Maintenance		Gains	
	M	*SD*	*M*	*SD*	*M*	*SD*	+/-	%
All Participants								
Overall	2.41	1.18	3.61	1.13	4.06	1.06	+1.20	149%
Section 1	2.22	1.20	3.50	0.90	4.00	0.89	+1.34	157%
Section 2	2.58	1.31	3.83	1.27	4.40	0.70	+1.25	148%
Section 3	2.38	1.06	3.50	1.24	3.80	1.48	+1.64	147%
Nancy								
Overall	1.17	0.98	3.22	1.56	4.11	0.60	+1.53	275%
Section 1	0.50	0.71	3.33	1.15	4.00	0.00	+2.83	666%
Section 2	1.00	0.00	3.00	2.00	4.33	0.58	+2.00	300%
Section 3	2.00	1.41	3.33	2.08	4.00	1.00	+1.33	166%
Kate								
Overall	2.14	0.90	3.33	1.00	3.00	1.12	+1.19	157%
Section 1	2.50	0.71	3.00	1.00	3.00	1.12	+0.50	120%
Section 2	1.67	1.15	4.00	1.00	3.67	0.58	+2.33	240%
Section 3	2.50	0.71	3.00	1.00	2.00	1.00	+0.50	120%
Beth								
Overall	2.75	1.04	3.89	1.05	5.00	0.00	+1.14	141%
Section 1	2.50	0.71	4.33	0.58	5.00	0.00	+1.73	173%
Section 2	3.25	0.96	3.67	1.15	5.00	0.00	+0.42	113%
Section 3	2.00	1.41	3.67	1.53	5.00	0.00	+1.67	184%
Olivia								
Overall	3.25	0.89	4.00	0.71	4.25	0.96	+0.75	123%
Section 1	3.00	1.00	3.33	0.58	3.50	0.71	+0.33	111%
Section 2	3.67	0.58	4.67	0.58	5.00	NA	+1.00	127%
Section 3	3.00	1.41	4.00	0.00	5.00	NA	+1.00	133%

*Note*: Gains = average gains from baseline to intervention.

Table 2

Percentage of Task Analysis Steps Correct for Each Performance Task

Participant and task	B	B Raw Data	Intervention	I Raw Data	Maintenance	M Raw Data
Nancy						
Section 1 - Intercom	25%	1/4	50%	3/6	50%	3/6
Section 2 - Handwashing	58%	7/12	67%	8/12	67%	8/12
Section 3 - Safety Rules	0%	0/9	100%	9/9	100%	9/9
Kate						
Section 1 - Intercom	33%	2/6	50%	3/6	33%	2/6
Section 2 - Handwashing	75%	9/12	75%	9/12	75%	9/12
Section 3 - Safety Rules	67%	6/9	100%	9/9	100%	9/9
Beth						
Section 1 - Intercom	50%	3/6	83%	5/6	100%	6/6
Section 2 - Handwashing	56%	9/16	75%	9/12	75%	9/12
Section 3 - Safety Rules	0%	0/9	67%	6/9	100%	9/9
Olivia						
Section 1 - Intercom	50%	3/6	50%	3/6	50%	1/2
Section 2 - Handwashing	69%	11/16	67%	8/12	67%	3/4
Section 3 - Safety Rules	0%	0/9	0%	0/9	0%	0/3
Overall						
Section 1 - Intercom	41%	9/22	58%	14/24	60%	12/20
Section 2 - Handwashing	64%	36/56	71%	34/48	73%	29/40
Section 3 - Safety Rules	17%	6/36	67%	24/36	90%	27/30

Note: Raw Data = number of steps performed correctly/number of steps total.
B = Baseline; I = Intervention; M = Maintenance.

Figure 1

Number of correct unprompted responses to comprehension questions.
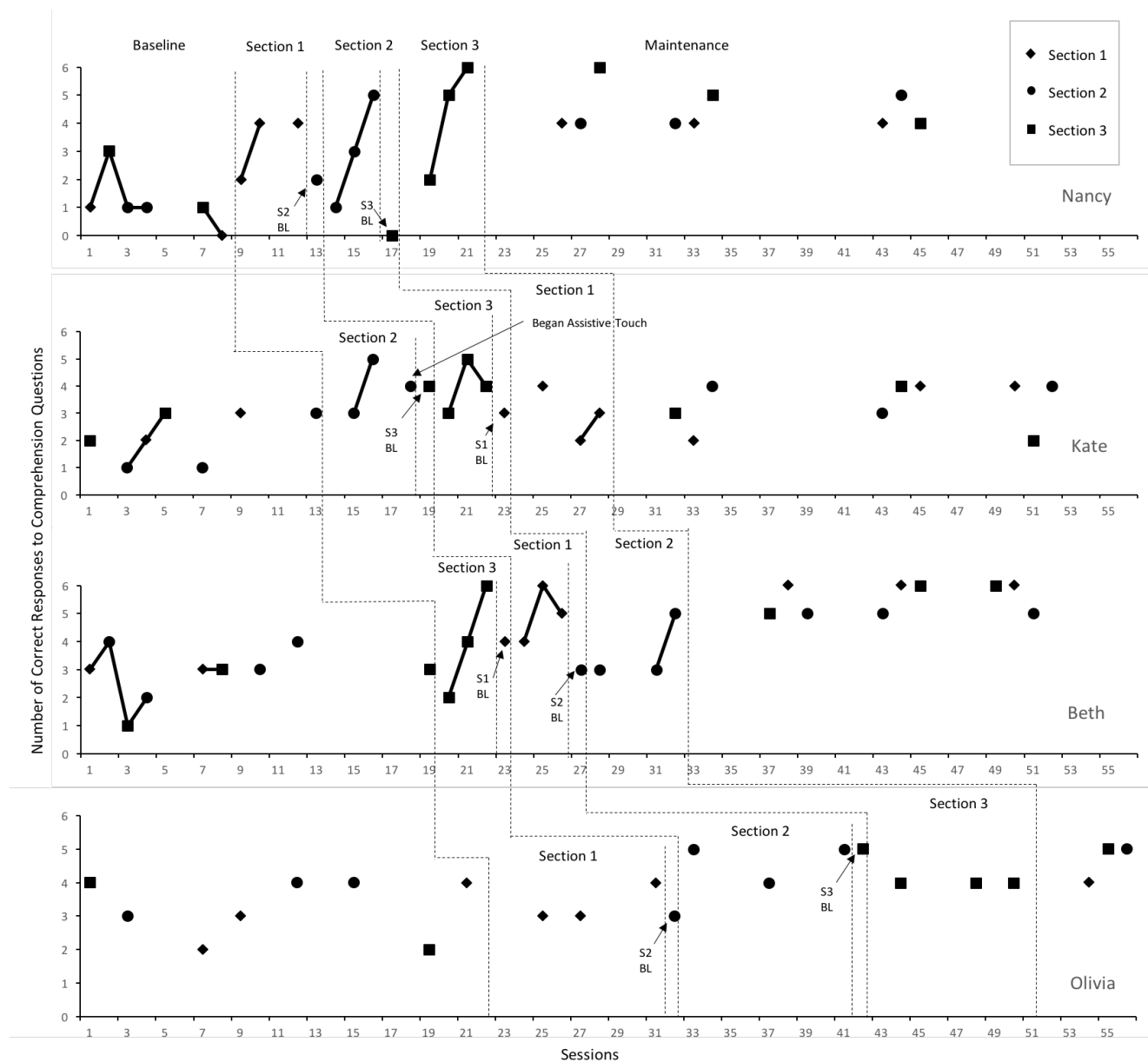
BL = baseline, S1 = handbook section 1, S2 = handbook section 2, S3 = handbook section 3.