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Effects of Mixed-reality Peer Interactions on Workplace Problem-solving of Individuals with Intellectual Disabilities

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EFFECTS OF MIXED-REALITY VIRTUAL PEER INTERACTIONS ON WORKPLACE PROBLEM-SOLVING OF INDIVIDUALS WITH INTELLECTUAL DISABILITIES

by

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ABSTRACT

Individuals with intellectual disabilities (ID) are known to have deficits in problem-solving skills within the realm of social communication, which may pose a barrier to employment (Livermore & Goodman, 2009). The ability to provide appropriate verbal responses is critical to success in an inclusive workplace for people with ID (Alber, Heward, & Hippler, 1999). Foley and colleagues (2013) found individuals with ID with strong communication skills were more likely to be engaged in independent employment than peers with weak communication skills. Furthermore, the Workforce Innovation and Opportunity Act (WIOA; 2014) mandated improved access to inclusive employment opportunities for people with disabilities. However, social communication for the workplace is a seldom addressed skill (Langford, 2013; Matsumoto & Hwang, 2013b).

In an attempt to contribute to the research base surrounding workplace communication skills for individuals with ID the researcher conducted an experimental group design study to examine the effects of mixed-reality virtual peer interactions on workplace problem-solving. The Innovative Facilitation of Requisite Communication Skills for Employment (In-FORCE) intervention consisted of four 5-minute interactions with a virtual avatar playing the role of a peer in the TLE TeachLivE™ (TLE) virtual environment. Each participant in the treatment group completed the intervention. During interactions participants discussed workplace problem scenarios with the peer avatar, and received coaching and feedback from the avatar. Scenarios were based on a soft skills curriculum from the U.S. DOL (n.d.) and were validated by experts in

the field of entry level employment. Problem-solving achievement was measured using a checklist. Checklist data were analyzed between pretest and posttest based on group assignment using a repeated measures analysis of variance (ANOVA) with one factor between.

The results of the analysis indicated positive change between pretest and posttest for individual members of the treatment group, but the results were not statistically significant. A possible reason for this lack of significance is the minimal amount of time participants spent engaged in the intervention. The 20 minutes total intervention time was advantageous as it (1) required participants to spend minimal time away from regular daily activities; (2) controlled the emotional impact of the interactions, as 5 minutes in a simulator has been found to have to the emotional equivalence of 30 minutes of human interaction (Dieker, Hynes, Hughes, & Smith, 2008); and (3) it allowed the intervention to be delivered at the cost of $40 per participant. Despite controlling for time in this study, more time engaged in the intervention may have led to more noticeable results. Building upon potential changes and future implications the researcher discusses the findings, implications for problem-solving and employment skills training, and the reconceptualization of research practices for individuals with ID.

I would like to dedicate this work, and my entire journey, to Chelsea. It's beautiful and amazing how you have been able to show me the course for the rest of my life without saying a word.

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The hardest part about saying thank you is remembering every kind thing that everyone has done for you along the way. Please know that even if I didn't get it in writing I noticed, and I care. Kindness, compassion, and good deeds go a long way in making the world a better place, and I'm honored to be surrounded by so many people who do just that!

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LIST OF ACRONYMS

AAIDD	American Association on Intellectual and Developmental Disabilities
AAMD	American Association on Mental Deficiency
ADA	The Americans with Disabilities Act
ANOVA	analysis of variance
AYP	annual yearly progress
BEH	Bureau of Education for the Handicapped
CEC	Council for Exceptional Children
DOE	United Stated Department of Education
DOL	United States Department of Labor
EAHCA	Education for all Handicapped Children Act
ESEA	Elementary and Secondary Education Act
ESSA	Every Student Succeeds Act
FAPE	free appropriate public education
GED	General Educational Development Exam
HCPA	Handicapped Children's Protection Act
ID	intellectual disability
IDEA	Individuals with Disabilities Education Act
IEP	individualized education program
In-FORCE	Innovative Facilitation of Requisite Communication Skills for Employment

IRB	Institutional Review Board
LRE	least restrictive environment
NCEO	National Center on Educational Outcomes
NCLB	No Child Left Behind
NLTS2	National Longitudinal Transition Study – 2
NTACT	National Technical Assistance Center on Transition
ODEP	United States Office of Disability Employment Policy
OSEP	United Stated Office of Special Education Programs
OSERS	United States Office of Special Education and Rehabilitative Services
P21	Partnership for 21st Century Learning
PARC	Pennsylvania Association for Retarded Children
SCANS	U.S. DOL Secretary's Commission on Achieving Necessary Skills
SWD	students with disabilities
TLE	TeachLivE™ Virtual Classroom
TAGG-S	Transition Assessment and Goal Generator, Student Version
U.S.	United States
UCF	University of Central Florida
VR	virtual reality
VSM	video self-modeling
WIA	Workforce Investment Act
WIOA	Workforce Innovation Opportunity Act

CHAPTER ONE: INTRODUCTION

Background and Need for the Study

According to the most recent Office of Special Education and Rehabilitative Services (OSERS) report to Congress, more than 400,000 students in the United States (U.S.) ages 6 to 21 are classified as having an intellectual disability (ID) and receive special education services because of this classification (U.S. Department of Education, DOE, OSERS, Office of Special Education Programs, OSEP, 2015). All of the students, identified as having an ID, referred to in the OSERS report are currently at an age to begin transitioning to post-secondary opportunities, or will be within the next decade.

The concept of transition was first defined in the 1990 re-authorization of the Individuals with Disabilities Education Act (IDEA). Transition services refers to a coordinated set of activities to meet a student's individual needs, promoting movement from school to post-school activities, including employment. Employment in inclusive community settings for individuals with ID, including those of transition age and those who finished as long as 45 years ago, is also the subject of federal legislative initiatives. The role of problem-solving and communication skills necessary for employment is a consideration within these initiatives.

Intellectual Disabilities

The American Association on Intellectual and Development Disabilities (AAIDD) recently published an updated definition of ID (Schalock et al., 2010). The three defining characteristics of ID are: (1) significant limitation in intellectual functioning; (2) significant limitation in adaptive behavior; and (3) onset of the disability before an individual reaches adulthood, which in the U.S. is established as the age of 18 (Schalock et al., 2010). This updated definition places less emphasis on IQ score as a determining indicator of intellectual functioning; however, IQ score may still be relevant for some evaluation and assessment purposes (Polloway, Patton, & Marvalin, 2011).

For the purpose of this study *individual with an ID* describes any person who has or had an educational classification of ID, or the formerly used term *mental retardation* during the time in which he or she was enrolled in school. Because participants in this study were as young as 16 and IDEA provides students with disabilities (SWD) the opportunity to enroll in public education through the age of 21, some participants in this study were enrolled in school and some were not. Individuals who were diagnosed with an additional disability that adversely affects educational performance, such as autism spectrum disorders, were not eligible to participate in this study.

ID and Problem-Solving Communication for Employment

As recently reported by the U.S. Department of Labor (DOL; Bureau of Labor Statistics, U.S. DOL, 2015), 26% of 16 to 64 year olds with disabilities were employed, as compared to nearly 72% of adults without disabilities in the same age group. In the final wave of data collection for the National Longitudinal Transition Study 2 (NLTS2), conducted in 2009, just over 37% of young adults with ID, ages 24 to 27 at that time, were employed. Individuals with

ID specifically may experience deficits in job-related skills, including communication and social problem-solving (Livermore & Goodman, 2009). These deficits may pose a barrier to gaining and sustaining employment (Livermore & Goodman, 2009). Social problem-solving is a component of adaptive behavior, an area in which individuals with ID have deficits, by definition (Schalock et al., 2010). Learning the social interaction skills related to employment has been proposed as a key factor of successful employment outcomes (Johnson, Mellard, & Lancaster, 2007). Strategies to build workplace social communication should be explored in order for individuals with ID to become productive members of society (Elias & Clabby, 1992; Gear, Bobzien, Judge, & Raver, 2011).

Individuals with ID may experience deficits in both verbal (Kroeger & Nelson, 2006; La Greca, Stone, & Bell, 1982) and nonverbal (La Greca et al., 1982) components of communication. Being able to provide appropriate verbal responses is a critical skill for the success of people with ID in workplaces alongside co-workers without disabilities (Alber et al., 1999). Nonverbal communication accounts for 65% to 95% of information exchanged in a conversation (Matsumoto & Hwang, 2013b). Although nonverbal communication comprises the majority of conversational exchanges, it is not frequently addressed in educational or workplace training settings (Langford, 2013; Matsumoto & Hwang, 2013b).

Holmes and Fillary (2000) posited that appropriate workplace interactions are learned from natural exposure to a range of such situations, something they identified as unlikely for individuals with ID. Because the amount of exposure to workplace interactions needed for appropriate social behaviors to generalize to new situations may be too demanding for individuals with ID, Holmes and Fillary recommended combining workplace experiences with preparatory training on social communication for the workplace.

Social Problem-Solving Communication Interventions for Individuals with ID

Carter, Sisco, Chung, and Stanton-Chapman (2010) found social interactions more difficult to study in individuals with low-incidence disabilities, which include ID. According to Carter and colleagues, studies commonly focus on younger students, with limited research on young adults or transition-related topics. The researcher examined current literature for research studies targeting workplace behaviors and the transition skills setting a foundation for workplace success. Fourteen studies were located using the search terms: “intellectual disability,” “mental retardation,” “disabilities,” “job,” “employment,” “employment training,” “job training,” “communication skills,” “social skills,” and “problem-solving skills.” Each study is summarized in Table 1. Twelve studies included participants with ID; two additional studies were included as well. The researcher considered the other studies notable for the use of role play (i.e., Alber et al., 1999) and a peer trainer (i.e., Nientimp & Cole, 1992) to increase appropriate social interactions. In all but one identified study, authors examined the effects of respective interventions using a single subject research design. Based on analysis of the research, multiple approaches emerged with potential to increase social skills and workplace problem-solving communication for individuals with disabilities.

Table 1: Research Studies Related to Workplace Behavior and Transition Skills

Reference	Target Skill	Intervention	Design	Disability Category	Participant Info	Findings	Relevant Component(s)
(Alber et al., 1999)	Recruiting positive teacher attention.	"Recruitment training" including: modeling, role play, corrective feedback, and praise.	Single subject, multiple baseline	LD	Four 6th grade students	SWDs can be taught to appropriately recruit adult attention. Training to recruit attention increased teacher praise for ¾ participants.	Social communication
(Collins, Ryan, Katsiyannis, Yell, & Barrett, 2014)	Correct, independent completion of job-tasks in an office setting.	Task analysis on iPod app offering video, auditory, and video/ auditory modes.	Single subject, alternating treatments (across modes)	ID	Three young adults in a post-secondary program	Portable technology promoted job independence "abrupt and substantial increase." Video/ auditory mode preferred, but all modes equally effective.	Job skills, Video technology
(Cote et al., 2010)	Increased problem-solving skills for self-determination.	Instruction on a 3-step problem-solving strategy including role play.	Single subject, multiple probe	ID	Four middle school students with ID (one male, three females, age 11-12)	Increase in skills for all participants. All improved at identifying problem and possible solutions.	Role play, Advocacy
(Gear et al., 2011)	Social behaviors for the workplace: (a) eye contact during conversations; (b) waiting to speak until others are finished, (c) appropriate verbal responses to directions, feedback or criticism	Structured role play to promote self-management.	Single subject, alternating treatments (role play with participant as self, or supervisor)	ID	One 20-year-old female with Down syndrome	Positive change in all target behaviors. Continued success during maintenance and follow-up.	Social communication, Role play

Reference	Target Skill	Intervention	Design	Disability Category	Participant Info	Findings	Relevant Component(s)
(Goh & Bambara, 2013)	Completion of chained job tasks	Video self-modeling (VSM) with and without feedback and practice	Single subject, multiple-probe across job tasks	ID	Three adults (2 male, 1 female) served in a university-affiliated supported employment program	VSM can be effective, but not conclusive evidence of effectiveness with or w/out feedback and practice; variability across participants. With one exception, VSM alone was not sufficient for teaching chained job tasks.	Job skills, Video technology
(Hoppe, 2004)	Improved transition behavior, constructs of (a) work-related, (b) interpersonal, (c) social community, and (d) overall	"Check and Connect" computer-assisted program incorporating FBA, BIP, and positive behavior support strategies. Incorporated networking with school staff and empowerment. Paid peer assistantships	Pre-post comparison of participants (using the Hawthorne Transition Behavior Scale)	LD, OHI, ED, and ID	20 SWDs who displayed characteristics of being at-risk for school failure	Increased means from pretest to posttest across constructs, most notably interpersonal. Increased motivation reported by students and school staff. Pay and interactive software identified as motivators.	Social communication, Job skills, Advocacy
(Hughes et al., 2011)	Increased conversational initiations and responses with general education peers	Communication book use with opportunities to interact with general education peers	Single subject, multiple-baseline across settings and participants.	ID with and w/out autism	Five young adults attending high school (3 male, 2 female)	Increased interaction by all participants	Social communication, Peer support

Reference	Target Skill	Intervention	Design	Disability Category	Participant Info	Findings	Relevant Component(s)
(Mautz, Storey, & Certo, 2001)	Increased workplace social interactions with co-workers	(a) Natural support from peer without a disability, (b) communication device without training	Single subject, multiple-baseline across times of day	ID	40-year-old male with ID, cerebral palsy, and epilepsy	Single strategy not effective, communication device with job coach training and natural support of co-worker led to increased social interactions.	Social communication, Peer support
(Mechling & Ortega-Hurndon, 2007)	Performance of complex, multiple-step (chained) job tasks	Computer-based video instruction (CBVI) in a simulated environment	Single subject, multiple-probe across tasks	ID	Three young adults with mild ID (2 male, 1 female) enrolled in a high school transition program based on a college campus	CBVI was effective in teaching job tasks for all 3 participants.	Job skills, Video technology
(Minarovic & Bambara, 2007)	Management of changing work routines	Sight-word checklists (consistently worded and varied) and self-management strategies	Single subject, multiple-probe across participants	ID	Three adult part-time supported employees with moderate ID Enrolled in university-based supported employment and rec program	Introduction of self-management increased correct self-monitoring responses and increases were maintained for all participants. Self-instruction training was key to success with sight-word checklist.	Job skills
(Nientimp & Cole, 1992)	Increased appropriate social responses to peers without disabilities	Constant time delay with a peer trainer without a disability	Single subject, ABA withdrawal for two participants, AB for third	Autism, PDD	Three middle school students in a self-contained classroom, 2 male (12 and 13) and one female (12)	Appropriate responses increased for all students, remained elevated for 2 participants who received withdrawal. Peer modeling and use of praise may have contributed to effect.	Social communication, Peer support

Reference	Target Skill	Intervention	Design	Disability Category	Participant Info	Findings	Relevant Component(s)
(Roessler & Foshee, 2010)	Increased performance levels and vocational identity	Occupational domain of Life Centered Career Education Curriculum	Clustered group, quasi-experimental, comparing general education students to SWDs engaging with curriculum	ID and LD	23 high school special education students with ID or LD	SWDs perceived more barriers to employment than peers without disabilities; intervention did not improve perception. Less desire for employment information reported by SWDs in post-test. SWDs performance increased pre-to-post but not in comparison to peers without disabilities.	Advocacy
(Sheppard & Unsworth, 2011)	Autonomous functioning for self-determination in everyday activities associated with: Self-Family Care (SFC), Life Management (LM), Recreation/Leisure (RL), and Social/Vocational (SV)	8-10 week residential educational program including specific instruction and additional practice for everyday skills as needed. Incorporated task analysis and least prompting	Single group, quasi-experimental, with 3 data collection points (over 18 months)	ID with or w/out other diagnoses	31 adolescents (11-18) with ID	Significant increases in SFC, LM, and RL. No significant changes detected for SV skills based on assessment, but positive ratings from parents, teachers, and students.	Social communication, Job skills, Advocacy
(Wehmeyer et al., 2011)	Self-determination through student involvement in transition planning	Whose Future is it Anyway? (WFA) lessons. Student-directed materials (36 sessions) related to transition planning and advocacy	Quasi-experimental, randomized trial with clustered treatment and control groups	LD, ID	493 middle and high school SWDs (11-22), majority LD and ID	Determined evidence of causal, positive of WFA increasing self-determination of SWDs.	Advocacy

Peer Support

Interacting with peers increases learning and helps individuals build relationships, improving quality of life for individuals with ID (Carter et al., 2010). Efforts to increase social skills also may lead to improved educational and employment outcomes for SWDs (Test, Fowler, White, Richter, & Walker, 2009). Using a peer as a trainer may improve social interaction interventions (e.g., Chadsey & Beyer, 2001; Chadsey, Shelden, Horn, Bardeleben, & Cimera, 1999; Ginsburg-Block, Rohrbeck, & Fantuzzo, 2006). In the studies identified by the researcher, peers without disabilities were incorporated in three interventions, with the objective of increasing appropriate social interactions (Hughes et al., 2011; Mautz et al., 2001; Nientimp & Cole, 1992). All researchers found positive outcomes. Despite evidence for partnering individuals with disabilities with peer trainers to develop social skills, no studies were found to involve a peer specifically to improve social problem-solving for individuals with ID (Hughes et al., 2012).

Role play

Another intervention found effective for supporting SWD, role play, is a commonly used assessment of social functioning for individuals with ID (Bielecki & Swender, 2004). After a situation is described to the participant, he or she describes or acts out a response to the scenario (Bielecki & Swender, 2004). Role play incorporates direct modeling and provides opportunities for appropriate social interaction, which can help participants build social competence (Shepherd, 2009). Role play of workplace situations can help employees increase appropriate social behaviors (Foy, Massey, Duer, Ross, & Wooten, 1979). Middle school students with ID demonstrated an increase in problem-solving skills when participating in an intervention that

included role play (Cote et al., 2010). Gear and colleagues (2011) studied the effects of role play on the workplace social communication of a woman with ID and found improved skills following the intervention.

Incorporation of Technology

Another option to support skill development for individuals with disabilities is technology (Edyburn, 2013). Three studies identified by the researcher included interventions for individuals with ID that incorporated video technology specifically. Collins, Ryan, Katsiyannis, Yell, and Barrett (2014) used audio, video, and audio/video task analyses to improve completion of job tasks for post-secondary program participants with ID. Goh and Bambara (2013) found success using video modeling to teach job tasks.

Virtual reality (VR) is another avenue for technology to create learning opportunities for individuals with ID (Standen & Brown, 2005). Mechling and Ortega-Hurndon (2007) used computer-based video instruction in a simulated environment to teach job tasks to three young adults with ID. A virtual environment can be used to create social scenarios for individuals with disabilities (Cobb, 2007).Virtual reality can help individuals with ID improve social and work skills (den Brok & Sterkenburg, 2015; Standen & Brown, 2005). Passig (2009) found practice in a virtual environment improved time perception for children and young adults with ID. Tam, Man, Chan, Sze, and Wong (2005) used virtual reality practice to help young adults with ID improve daily living skills.

In-FORCE Intervention

Based on current research in the areas of workplace skills, communication, and individuals with ID more research is needed in the areas of (a) social communication (Foley et al., 2013; Hughes et al., 2012); (b) peer interaction (Carter et al., 2010; Hughes et al., 2011, 2012; Mautz et al., 2001; Nientimp & Cole, 1992); (c) role play (Cote et al., 2010; Gear et al., 2011; Shepherd, 2009); and (d) virtual reality-based interventions for individuals with ID (den Brok & Sterkenburg, 2015; Passig, 2009; Standen & Brown, 2005; Tam et al., 2005). Current research shows positive effects of using these techniques for workplace and social outcomes for individuals with ID. Given this evidence, a synthesis of these elements may lead to improved workplace social problem-solving communication for individuals with ID.

In-FORCE (Innovative Facilitation of Requisite Communication Skills for Employment), the training program used for this study, incorporated these elements into a virtual environment. In this study participants engaged in problem-solving role play in a mixed-reality environment. The problem scenarios used in the In-FORCE intervention were developed based on a social skills curriculum created by the DOL (n.d.). Twenty scenarios were created and validated by a group of six experts. Seven scenarios were validated by a group of young adults with ID during a pilot study related to this research. Each scenario was made into a video featuring a narrator describing the problem and an adult virtual avatar, in the role of the supervisor, stating the supervisor dialogue featured in the scenario. Treatment group participants met with the virtual peer avatar, C.J., about four different problem scenarios. Changes in problem-solving skills were measured using pretest and posttest meetings with a virtual supervisor avatar, Ms. Adkins. Both peer and supervisor virtual avatars are pictured in Figure 1.

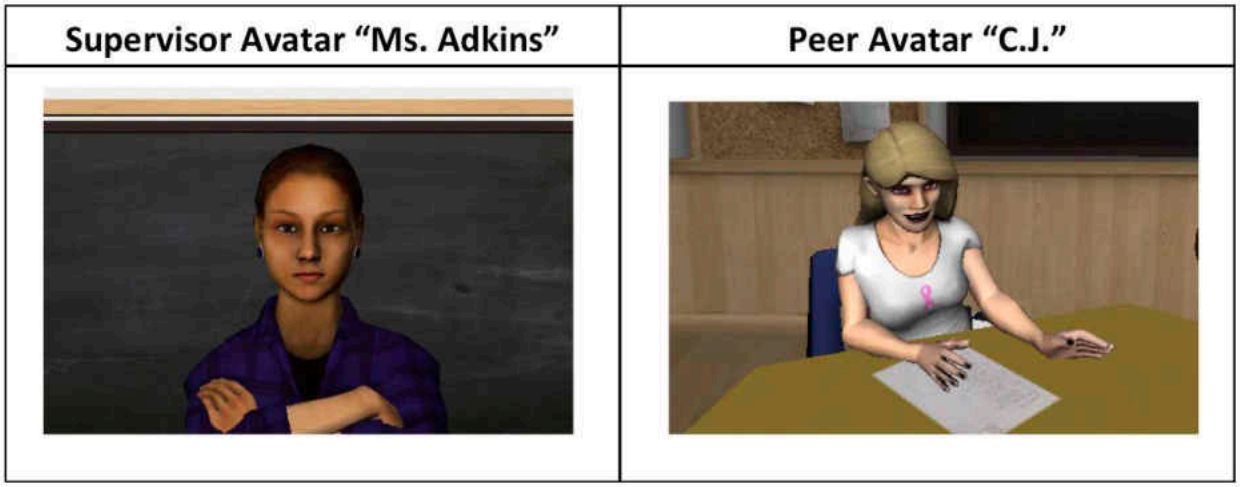


Figure 1: Virtual Avatars from In-FORCE Training

The researcher proposed that conversations in a mixed-reality environment, with a virtual peer avatar, could potentially improve workplace problem-solving communication skills of individuals with ID. The In-FORCE intervention incorporated role-play interactions, with a peer avatar, in the TeachLivE™ virtual classroom (TLE) with expertly validated workplace problem scenarios.

The TeachLivE™ virtual classroom was originally developed to offer mixed-reality experiential learning opportunities to teachers (Dieker, Straub, Hughes, Hynes, & Hardin, 2014). The TLE research team has determined as few as four, 10-minute sessions in the TLE environment could shape behaviors in a positive way (Straub, Dieker, Hynes, & Hughes, 2014). TLE technology has also been used with elementary-aged students to target phonics skills through peer tutoring sessions with virtual avatars (Bukaty, 2014). Stendal, Balandin, and Molka-Danielsen (2011) concluded for some people with disabilities, communicating with a virtual avatar poses less social barriers and challenges than communicating with a real-life peer (Stendal et al., 2011).

Statement of the Problem

Individuals with ID are engaged in employment at a lower rate than their peers without disabilities (Bureau of Labor Statistics, U.S. DOL, 2015; Newman et al., 2011). The lack of problem-solving skills within the realm of social communication in people with ID poses barriers to gainful employment (Livermore & Goodman, 2009). Foley and colleagues (2013) found that individuals with ID with stronger skills in the area of communication were more likely to be engaged in independent employment than those with less developed communication skills.

Rationale

The negative impact of underdeveloped social communication and problem-solving, and the documented lack of instruction on social communication related to individuals beyond elementary school age (Carter et al., 2010) and workplace situations (Langford, 2013; Matsumoto & Hwang, 2013b), indicates the need for a specific workplace problem-solving skill-building intervention for individuals with ID if they are to become productive members of the workforce in 21st century society. In this study, the researcher examined the effects of In-FORCE as an intervention to improve problem-solving communication needed in the workplace for young adults with ID.

Research Questions

To measure the effectiveness of the In-FORCE workplace problem-solving intervention the researcher conducted a group design study addressing the following research questions: (1) To what extent do In-FORCE problem-solving intervention sessions increase the abilities of

young adults with ID to implement verbal workplace problem-solving skills, as measured by the rate of independently achieved objectives in a problem-solving checklist based on standards from the U.S. DOL Secretary's Commission on Achieving Necessary Skills (SCANS; 1991)? (2) To what extent do In-FORCE problem-solving intervention sessions increase the abilities of young adults with ID to implement nonverbal workplace problem-solving skills, as measured by the rate of independently achieved objectives in a problem-solving checklist based on standards from the U.S. DOL SCANS (1991)?

Research Design

The researcher examined the effects of the In-FORCE mixed-reality role play intervention on workplace communication skills of individuals with ID. The effects of the intervention were examined using an experimental group design with a pre-post measure (Gall, Gall, & Borg, 2007) . The design of the study was experimental because participants were randomly assigned to either the treatment or the control group using a matching procedure (Gall et al., 2007). An equal number of participants were assigned to each group. Random assignment of members of each matched pair allowed for the assessment of pre to post achievement of each group as well as comparison between the groups.

Treatment and Control Conditions

The In-FORCE intervention was studied using a treatment and control group. Participants were randomly assigned to either group using a matching technique. All participants in both groups participated in the training session, including: (1) welcome and introduction to the

concepts of role play and virtual avatars, (2) meet-and-greet session with an avatar, and (3) viewing of a sample problem scenario not used in the pre-test, post-test, or intervention sessions. The meet-and-greet served to ensure that all participants were able to interact successfully with a virtual avatar.

All participants in both groups completed a pretest problem-solving interaction with Ms. Adkins, the virtual supervisor avatar, after completing the training. For the pretest, all participants discussed the same randomly selected problem scenario, Scenario 5. All participants in both groups completed a posttest problem-solving interaction with Ms. Adkins, discussing the same randomly selected problem scenario, Scenario 3. Pretest and posttest interactions followed a dialogue guide to ensure consistency (see Appendix A), and the opportunity for each participant to meet each problem-solving objective (see Appendix B). Each interaction lasted five minutes or less. All participants completed a social validity perception survey following the posttest in which they were asked to answer dichotomous questions about their experiences interacting with Ms. Adkins (see Appendix C).

Participants in the treatment group received the intervention, with all participants in this group completing four additional 5-minute problem-solving interactions with C.J., the virtual peer avatar. The first interaction with C.J. was preceded by a brief introduction to the C.J. avatar. During each intervention interaction, each participant discussed the same randomly selected problem scenario not used in any other interactions. Each interaction with C.J. followed a dialogue guide to ensure consistency (see Appendix D), and provided each participant with the opportunity to practice each problem-solving objective (see Appendix B). The perception survey taken by participants assigned to the treatment group included additional questions about

participants' experiences interacting with C.J. Research activities and data collection points are shown in Figure 2.

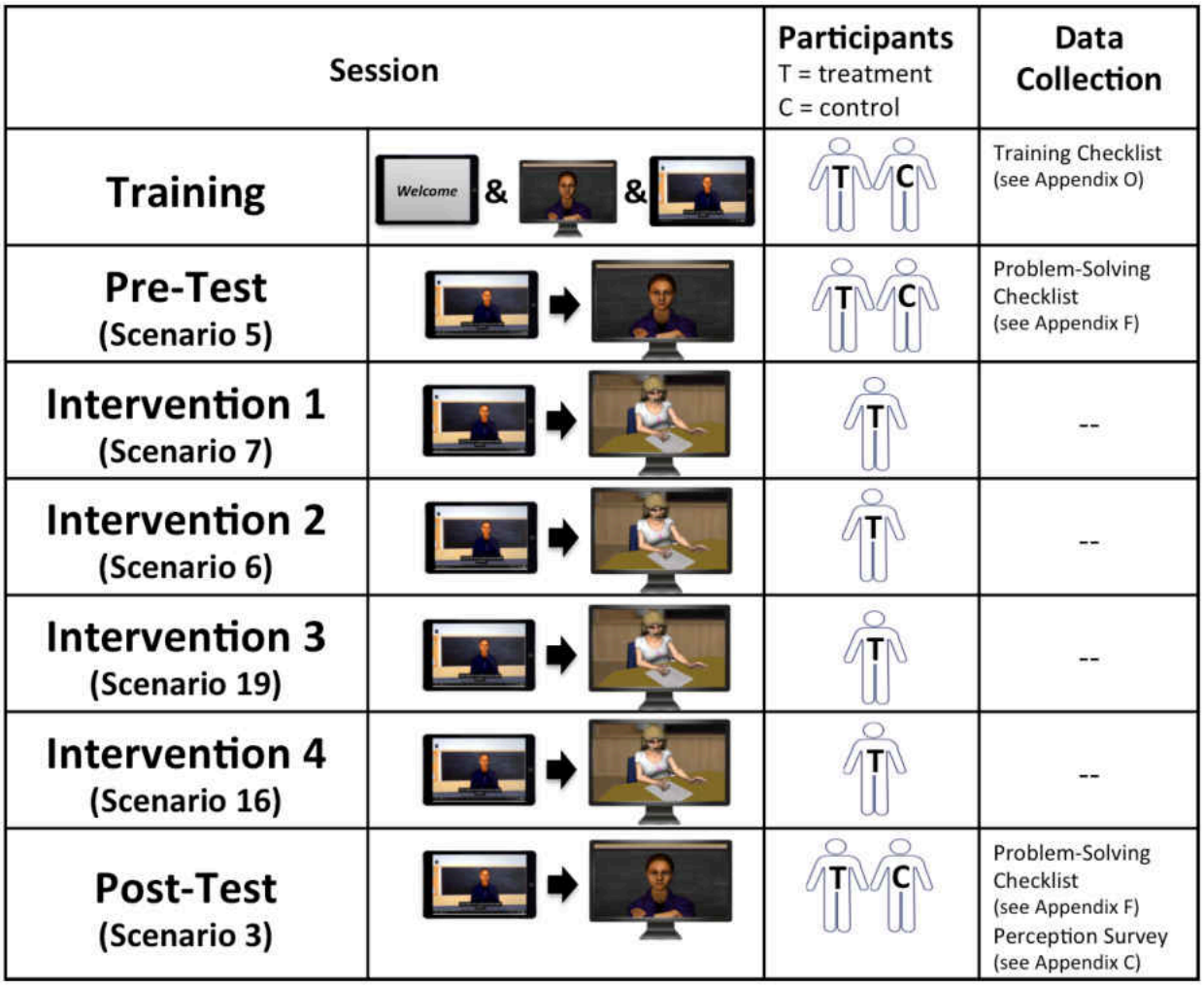


Figure 2: In-FORCE Data Collection and Intervention Schedule

Data Collection Procedures

Data were collected at five points during the study: (1) upon completion of the consent process, (2) during the training session, (3) during the pretest interaction, (4) during the posttest interaction, and (5) following completion of the posttest. The demographic survey (see Appendix E), completed following the consent process, provided the researcher with additional information

about each of the participants. Also, following the consent process, each participant took the Transition Assessment and Goal Generator, Student Version (TAGG-S; Martin, Hennessey, McConnell, Terry, & Willis, 2015) to drive the matching procedure in preparation for assignment to the treatment or control group. The *In-FORCE Problem-Solving Objective Checklist* (see Appendix F) was completed by the researcher during each pretest and posttest interaction, and 30% of the interactions were evaluated by an additional trained observer to ensure reliability of the ratings. Finally, participants completed the *Perception of In-FORCE Training* survey (see Appendix C) following the posttest interaction.

Data Analysis

For research questions 1 and 2, the researcher analyzed the data to assess a difference in means of participants' achievement of problem-solving objectives in the verbal and nonverbal subsets, as measured by the *In-FORCE Problem-Solving Checklist* (see Appendix F) between pretest and posttest based on group assignment. The problem-solving checklist was developed based the definition of problem-solving established by the U.S. DOL SCANS and correlated to *Framework for 21st Century Learning* and *Taxonomy for Transition Programming 2.0* (see Appendix B). After development, six experts from the fields of post-secondary transition and entry-level employment validated the problem-solving checklist. When the checklist was used in a pilot study in spring 2015, initial data analyses indicated that two raters achieved greater than 80% inter-observer reliability. Each subset score was compared between the pretest and posttest based on assignment to the treatment or control group using a repeated measures analysis of variance (ANOVA) with one factor between and an alpha level of .05. A repeated measures ANOVA with one factor between also was used to compare pretest to posttest changes on the

total checklist score based on group assignment. Additionally, the McNemar test of correlated proportions was used to analyze pretest to posttest change for each objective in the checklist for both groups.

List of Terms and Definitions

Avatar

An avatar is a virtual character inhabited and controlled by a human-in-the-loop, referred to as an interactor (Nagendran, Pillat, Kavanaugh, Welch, & Hughes, 2014). Each character represented within TLE is an avatar. Every TLE avatar has a unique and appropriate personality based on the role of the avatar to be presented to the participant (Dieker et al., 2008). In the present study all participants interacted with a supervisor avatar, Ms. Adkins, who took the role of the participants' supervisor during all interactions. Treatment group participants also interacted with a peer avatar, C.J., who took the role of treatment group participants' peer during all interactions.

In-FORCE Intervention

In-FORCE is an intervention designed to take place in the TLE environment. The intervention package was developed by the researcher in the fall of 2014 and tested in a pilot study in spring 2015.

Intellectual Disability

According to the AAIDD, a person with an ID is diagnosed based on the following characteristics: (1) significant limitations in intellectual functioning, (2) significant limitations in adaptive behavior, and (3) onset before an individual reaches adulthood (Schalock et al., 2010).

Interactor

The term interactor refers to a "highly trained professional capable of embodying many different, disparate avatars" (Nagendran et al., 2014, p. 110). Interactors puppeteer the virtual avatar(s) in the TLE environment (Straub et al., 2014). Interactors work within the developed characteristics of each virtual avatar but improvise interactions, allowing each avatar to present a unique and appropriate personality (Dieker et al., 2008). For the purpose of this study, all interactions followed dialogue guides for consistency and an observer evaluated 30% of all interactions to monitor fidelity.

Nonverbal Communication

Nonverbal communication is comprised of all elements of an interaction not dependent on words (Matsumoto & Hwang, 2013b). According to Matsumoto and Hwang (2013b), 65% to 95% of information communicated during a conversational exchange is nonverbal.

Problem-Solving

For the purpose of this study problem-solving will refer to the use of social communication to reach a resolution to a given workplace-based problem within a conversation. Social problem-solving is an adaptive behavior within the subset of *social skills* (Schalock et al., 2010).

Role play

Role play involves the presentation of a simulated situation; an individual is then asked to act out his or her response to the situation (Bielecki & Swender, 2004). The role play carried out in this study will be standardized based on the dialogue guides and on the premise of a meeting with a peer or supervisor to discuss a scenario that could occur in the workplace.

TeachLivE™ Virtual Classroom

The TLE is a mixed-reality learning environment populated by virtual avatars. The TLE was developed at the University of Central Florida (UCF) as an instructional tool for use with pre-service teachers (Dieker et al., 2014). All interactions within this study took place within the TLE environment.

Transition

Transition, in the form of transition planning or transition programming, was first introduced into federal legislation in the 1990 reauthorization of IDEA. In IDEA transition planning is defined as the identification of goals related to post-secondary outcomes (i.e., objectives for education, work, and living beyond high school) and activities to help students meet those objectives.

Verbal Communication

For the purpose of this study, verbal communication will be defined as the parts of an interaction driven by words and statements, and the content of those words and statements.

CHAPTER TWO: LITERATURE REVIEW

Chapter Overview

In this chapter, the researcher presents a detailed description of individuals with intellectual disabilities (ID), including the history and current definition of ID, characteristics and needs of individuals with ID, and post-school employment outcomes for this population. Information includes an overview of historical and current educational practices and legislation for students with disabilities (SWD), including those with ID. The researcher examines current employment trends in the United States (U.S.), including employment trends and legislative initiatives for individuals with ID. A special focus is given to the areas in which people with ID could benefit from support to achieve successful employment outcomes. Finally, the researcher examines interventions to increase successful achievement of workplace outcomes for people with ID, especially interventions incorporating emerging technology.

Intellectual Disability

The definition of ID has developed and evolved over time, as have the criteria and approach for diagnosing an individual with an ID (Schalock et al., 2010). Since the mid-1900s, four approaches to defining and diagnosing ID have emerged, each based on societal trends and ways of thinking (Schalock et al., 2010). There are many known causes of ID, including

biological (i.e., internal) and environmental (i.e., external) factors, but often, especially for individuals with less extreme impairments, no specific cause can be determined (Polloway et al., 2011).

History of ID

The earliest approach to determining that individuals had an ID relied on social adaptation as an indicator, because at that time the importance of intelligence in society was not emphasized (Schalock et al., 2010). Doll (1941) described components of a definition of ID encompassing deficits in social adaptation and social behavior, but he acknowledged the pressing need to establish better methods of quantitative measurement when evaluating an individual's intellectual functioning. The social approach shifted to a more clinical analysis and definition with the rise of the medical model (Schalock et al., 2010). With the emergence of intelligence testing came an emphasis on IQ score as a measure of intelligence and as the basis for ID definition and diagnosis. Out of the clinical model emerged a definition emphasizing symptomology and medical characteristics of ID (Schalock et al., 2010). Finally, in 1959, the American Association on Mental Deficiency (AAMD), later renamed the American Association on Mental Retardation and now called the American Association on Intellectual and Developmental Disabilities (AAIDD), introduced a definition combining below average intellectual functioning with deficits in "maturation, learning, and social adjustment" (Heber, 1959, p. 6). Maturation, learning, and social adjustment were later coined in aggregate by the AAMD as *adaptive behavior* (Heber, 1961). This dual-criterion approach also considers the age of onset of ID (Schalock et al., 2010). Each historic approach to defining ID is represented in the definition used today (Schalock et al., 2010).

Current Definition of ID

Intellectual disability is currently defined by the AAIDD as a disability comprised of three characteristics: (1) significant limitation in intellectual functioning; (2) significant limitation in adaptive behavior; and (3) onset of the disability before an individual reaches adulthood, which in the U.S. is established as the age of 18 (Schalock et al., 2010). Updated definitions of ID include less emphasis than historical descriptions on IQ score as an indicator of ID (Polloway et al., 2011; Schalock et al., 2010). The language in the 2004 reauthorization of the Individuals with Disabilities Education Act (IDEA) defines ID using the same three characteristics designated by the AAIDD, with the additional stipulation within IDEA that the presence of such deficits "adversely affects a child's educational performance."

The first characteristic of ID, significantly limited intellectual functioning, is not as dependent on an individual's IQ score as in the past; however, IQ is still used as part of psychoeducational assessment and identification in schools (Polloway et al., 2011). A frame of reference for a significant limitation in intellectual functioning is an IQ score of 70; however, a score as high as 75 is still considered to present a limitation (Schalock et al., 2010). The AAIDD identifies individuals falling in the higher range of IQ as having borderline intellectual functioning (Schalock et al., 2010). The AAIDD still considers individuals with borderline intellectual functioning as needing and benefiting from individual support (Peltopuro, Ahonen, Kaartinen, Seppälä, & Närhi, 2014).

The second characteristic of ID, deficits in adaptive behavior, refers to skills learned and performed in everyday life. Adaptive behavior includes (a) conceptual, (b) social, and (c) practical skills (Schalock et al., 2010). Conceptual skills refer to skills surrounding language and numbers, including handling money and telling time. Social skills refer to an individual's

interpersonal skills. Elements of social skills include social responsibility, social problem-solving, following rules and laws, and being able to avoid victimization (Schalock et al., 2010). People with ID exhibit less social engagement as children, and participate in less group play; they also are less capable of processing social information and cues. Practical skills are the daily living skills an individual must use for personal care and daily living. Examples of practical skills include arranging healthcare, travel and transportation, establishing routines, and using a telephone or other means of communication (Schalock et al., 2010).

Intellectual disability is especially notable in the discussion of the evolution of terminology used when referring to people with disabilities (Polloway et al., 2011). The AAIDD changed its name, as an organization, from the previous American Association on Mental Retardation, to replace the formerly used term *mental retardation* (Polloway et al., 2011). In addition to being a more respectful and internationally relevant term, *intellectual disability* is better aligned with the definition of the disability and services and practices used to support individuals with ID (Schalock et al., 2010). Educational and government entities also have adopted the term ID in recent years (Polloway et al., 2011). The AAIDD (2013) advises professionals to be mindful that individuals with ID possess strengths alongside their limitations.

Education for Students with ID

In this section, the researcher describes the legislative history of educational policies for SWDs, including individuals with ID. Legislation is discussed as whole policies, with each section including the original legislative item and information on any reauthorizations.

Educational opportunities for SWDs have existed for more than a century. Based on literature within the field, access to higher educational opportunities has not always been

consistent for SWDs, and practices have not always been optimally informed. Educators and advocates committed to upholding the educational and civil rights of individuals with disabilities have made noteworthy advances through the evolution of special education. From the complete societal segregation of early 20th century institutions to today's universally designed learning opportunities for all students, the field of education for SWDs continues to evolve.

History of Education for SWD

Institutions

Through most of the 19th century, the responsibility for the care of individuals with disabilities fell primarily on family members (Barnett, 1986). In the early 20th century residential facilities began to emerge to address care and training needs. Initially, these facilities were founded with the mission of protecting individuals with disabilities from the world around them (Barnett, 1986). Also, residential schools or facilities for individuals with disabilities were said to be based on the concept of training and rehabilitation, accepting only individuals who showed potential for rehabilitation, and constructed with a home-like atmosphere, often using a cottage set up to simulate a family unit (Rochefort, 1981). Individuals with disabilities were expected to receive rehabilitation services, medical attention, recreation opportunities, and educational services (Rosen, 1984).

As time progressed, this model did not continue in the same tradition upon which it was founded. The focus of institutions shifted from a goal of rehabilitation to that of custodial care (Rosen, 1984). Residential schools or institutions were no longer meeting goals of providing education or facilitating successful educational outcomes (Barnett, 1986). Institutions began accepting individuals without regard to the previously expected potential for rehabilitation and

the mentality of the model shifted from protecting individuals with disabilities from the world around them to the idea that society needed to be protected from individuals with disabilities (Barnett, 1986). Eventually, resources within institutions became so scarce, that even if high-quality care and rehabilitation were to be attempted, it would have been nearly impossible to achieve (Rochefort, 1981).

Moving Towards Equality in Education

An initiative towards the special education services in place today was the civil rights movement of the mid-1900s. In the 1954 *Brown v. Board of Education* decision the federal government intervened in the provision of public education, as evidenced by the resulting ruling abolishing racially-based segregation in public schools. Although *Brown v. Board of Education* was not related to students with disabilities, it opened the door for the goal of access to public education for all students on equal terms (Brownell, Sindelar, Kiely, & Danielson, 2010; Rudd, 2002). The influence of the *Brown v. Board of Education* decision was used by advocates of SWD to encourage inclusion, as this was the first indication of the idea that a separate setting of any sort did not provide equal educational opportunities (Diaz, 2013; Nolan, 2004). This lack of equity created a need for government regulations and agencies to oversee the education, advocacy, and protection of individuals with disabilities.

Bureau of Education for the Handicapped / Office of Special Education Programs

The Bureau of Education for the Handicapped (BEH), later renamed the Office of Special Education Programs (OSEP), was created in 1966 as part of an amendment to the Elementary and Secondary Education Act (ESEA) to represent the needs of SWDs within the field of education. The ESEA, originally authorized in 1965, allocated federal funding to support states

in providing education to students of poverty and SWD. The BEH established the National Advisory Committee for Handicapped Children, the goal of this committee was to allow national experts to build a partnership with professionals in the field of special education (Kirk, 1968). In the 1970s the BEH/ OSEP began supplying funding to teacher preparation programs at colleges and universities with the objective of producing highly qualified teachers for SWD (Brownell et al., 2010).

Court Cases Relating to SWDs

As a result of developing emphasis on the educational rights of SWDs, instances of unfair treatment were brought to light in state and federal proceedings. Two court cases specific to the educational rights of SWDs served as precursors for comprehensive federal mandates. The outcomes of these cases served to establish basic procedural rights for SWDs moving forward (Yell, Katsiyannis, & Bradley, 2011).

The first of these cases, *Pennsylvania Association for Retarded Children (PARC) v. Pennsylvania* (1971), was related specifically to the rights of students with ID. The lawsuit was brought about by parents of students with ID who were denied admission to public school and access to public education (Nolan, 2004). The resolution of *PARC v. Pennsylvania* resulted in the PARC Decree (1971), stating the state of Pennsylvania could not deny education to any student on the grounds he or she was labeled as uneducable or untrainable; this included students with ID. The PARC decree was the first legislative articulation of the idea of free appropriate public education (FAPE), a concept that would later be established at the federal level (Diaz, 2013).

Mills v. Board of Education (1972) resulted in the defense of the rights of seven SWD seeking public education in Washington, D.C. schools. In addition to a ruling aligned with the

principle of FAPE, students were expected to be included in the least restrictive setting (LRE), foreshadowing another element of forthcoming federal regulations (Diaz, 2013; Dybwad, 1980; Yell & Espin, 1990). The resolution of *Mills v. Board of Education* also included language specifying that in Washington, D.C., education could not be denied to a SWD based on a district's inability to fund the student's attendance.

Section 504 of the Rehabilitation Act of 1973

The Rehabilitation Act of 1973 has been identified as a precursor to the Americans with Disabilities Act (ADA) of 1990, as the first piece of civil rights legislation for individuals with disabilities (Nolan, 2004; Reed, 1992). Section 504 of this Act offered the most impact to access for people with disabilities (Nolan, 2004). Section 504 indicated no establishments receiving funding from federal, state, or local governments could discriminate against individuals with disabilities. Accessibility requirements were enforced for any government funded establishments, including public schools, an element which further advanced initiatives to equal educational opportunities for SWD (Nolan, 2004; Reed, 1992).

Each of the aforementioned events occurred before 1975, a year considered a tipping point for special education in today's society. From the rise and fall of the first residential schools or institutions for individuals with disabilities, to court cases and federal legislation aimed at ensuring equal rights and access to SWD, these events have served as vehicles to further ensure the equal rights of individuals with disabilities in American society. While each of these events represents only a small, incomplete step towards equal rights and full access, each can be viewed as a contribution to the collective, ongoing progress of equal rights for individuals with disabilities.

The seminal piece of legislation enacted in 1975 was the Education for all Handicapped Children Act (EAHCA, P.L. 94-142). Initiatives of this piece of legislation were later enforced by three reauthorizations, known as the Individuals with Disabilities Education Act (IDEA) in 1990, 1997, and 2004. Other notable contributions to the field of special education during this time included the Handicapped Children's Protection Act of 1986 and ADA of 1990. Although the latter was not enacted specifically for children, its benefits were far-reaching. Finally, the 2001 passage of No Child Left Behind (NCLB), a reauthorization of ESEA, applied to all students, not just those with disabilities, and set a national tone for the expectation of high student achievement. The ESEA was reauthorized again in 2015 as the Every Student Succeeds Act (ESSA).

Education for All Handicapped Children Act

The Education for All Handicapped Children Act (EAHCA; P.L. 94-142) of 1975 authorized the federal government's most significant increase in contribution to the field of special education (Yell et al., 2011). Reauthorized three times under a different name, EAHCA ensured rights for SWD and their families as well as support for state and local governments to provide education for SWDs. An enduring element of EAHCA is the concept of FAPE for all SWDs. As the name suggests, SWDs were guaranteed an education in the public school setting by this legislation; this right could not be denied based on a student's disability, his or her perceived ability to learn, or the amount of funding available to the local or state government to support this initiative. The term "zero-reject" was used to describe this policy (*EACHA*, 1975; Rudd, 2002). A landmark federal court decision on the topic of FAPE was decided in 1982, in the case of *Board of Education v. Rowley.* The parents of a first grade student from New York

State with a significant hearing impairment took action against the school district after their request for a full-time interpreter was denied. The school district was already providing other types of support services, and claimed the student was achieving commensurate with her peers. The parents claimed the student's achievements did not reflect her full potential as indicated by her above average IQ (Diaz, 2013). The federal court determined that school districts were bound to provide sufficient adequate support for a student to realize academic benefit, not necessarily to the extent to maximize student potential. This concept of providing a level academic platform established in *Board of Education v. Rowley* was applied to future education litigation (Hyatt & Filler, 2011). In the *Board of Education v. Rowley* the courts established two questions to assess a district's provision of FAPE: (1) Did the district apply applicable procedures? and (2) Is the individual education program (IEP) reasonably calculated to enable the child to receive educational benefits?

According to EAHCA, SWDs were to be provided with IEPs, to describe and ensure the receipt of all necessary and appropriate educational services. These documents were required to meet standards of quality (EAHCA, 1975). Language within EAHCA also included definition of the concept of LRE, stating students should learn in the environment with the least amount of obstacles to their progress, accessing academic material to the closet possible degree as their peers without disabilities. It was reported that these new regulations caught many schools and teachers unprepared, with inadequate resources and ineffective, or non-existent ways to evaluate available programming. Due to the lack of a better model, many students were placed in classrooms with similar students, based on their disability (Brownell et al., 2010). The main elements of EAHCA endure in the current landscape of special education. Current research

reflects a continued call for further analysis and reform of guidelines surrounding FAPE and LRE.

Handicapped Children's Protection Act

Another step towards reform efforts was the passage of the Handicapped Children's Protection Act (HCPA) of 1986. This measure was put in place to further protect the rights of SWD and their parents, as well as school districts, by solidifying due process and enacting procedural safeguards. The act awarded attorney's fees to parents who rightfully challenged school districts in regards to the education of their child with a disability. Protection also was afforded to school districts through the inclusion of a regulation prohibiting either party from prolonging proceedings relating to these rights. Compensation under HCPA could be applied to cases retroactively, as this was considered overdue following the enactment of EAHCA (Yell & Espin, 1990).

Americans with Disabilities Act

The ADA of 1990 was a federal civil rights legislation aimed at providing universal access to people with disabilities. Although ADA was not exclusive to children, or educational settings, it carried a far-reaching impact for accessibility still being realized across the United States (K. Walker, 2014). The concept of ADA was based on Section 504 of the Rehabilitation Act of 1973 (Reed, 1992). Beyond establishments receiving government funding, ADA applied to any and all public establishments, requiring accessibility for people with disabilities and reiterating the prevention of discrimination. The ADA applied not only to the accessibility of all public buildings, but also to services, including transportation and telecommunication.

Individuals with Disabilities Education Act

Following the enactment of EAHCA, the act was reauthorized three times as IDEA. The initial reauthorization in 1990 included the updated name to reflect person-first language. Use of person-first language in the title of the legislation aligned with changes in terminology relating to people with disabilities which took place throughout the 1980s to reflect person-centered, accepting ideologies (Brolin & Gysbers, 1989). The major provisions of EAHCA stayed in place through IDEA 1990, and in subsequent reauthorizations, including IEPs, FAPE, and LRE. The concept of LRE was reinforced as the goal of SWDs spending the maximum amount of time in the general education setting with peers without disabilities. New elements present in IDEA 1990 included the addition of autism and traumatic brain injury as disability classifications for students. Also, transition planning was defined and required in IDEA 1990 and subsequent reauthorizations. Beginning at the age of 16, students' IEPs were required to contain goals related to post-secondary outcomes (i.e., objectives for education, work, and living beyond high school) and activities were to be identified to help students meet those objectives.

The next authorization of IDEA was enacted in 1997. Students with disabilities were promised not only an education, but an education meeting a higher level of opportunity (Odom, Buysse, & Soukakou, 2011). Access to the general education curriculum was further emphasized for SWD, as was the expectation of progress in the general education curriculum (McLeskey, Landers, Williamson, & Hoppey, 2012). The 1997 authorization of IDEA added early intervention, providing services to preschool-aged children who did not satisfactorily meet developmental milestones. Three to five year olds were granted public education opportunities, while children under the age of three were granted services in their natural home settings, with an emphasis on family involvement.

The most recent reauthorization of IDEA in 2004 further increased the expectation of positive academic outcomes for SWD (Yell et al., 2011). Students were expected to spend the maximum amount of appropriate time in the general education classroom. Researchers noted the alignment of IDEA 2004 to NCLB, the 2001 reauthorization of ESEA (Benedict, Thomas, Kimerling, & Leko, 2013; Brownell et al., 2010). Both legislative items called for assurances of student progress and increased accountability, including emphases on professional development (Brownell et al., 2010).

No Child Left Behind 2001

No Child Left Behind was enacted in 2001 as a reauthorization of ESEA. The focus of NCLB differed from that of IDEA in that it was a legislative piece for all children including, but not limited to, SWD (McLeskey et al., 2012). A major impact of NCLB was the mandate for *highly-qualified* teachers. Most special education teachers at the time NCLB was enacted were not highly qualified; this resulted in another compelling push for inclusion and led to a national increase in co-teaching models to serve SWD (McLeskey et al., 2012). Another focus of NCLB was a need for increased accountability for outcomes of students with and without disabilities; states were expected to ensure all students were making annual yearly progress (AYP); most states turned to high stakes assessment to meet these accountability standards (Benedict et al., 2013).

Every Student Succeeds Act

The ESSA was signed into law in late 2015. The enactment of ESSA represents a reauthorization of ESEA, replacing NCLB. This is a broad piece of legislation regarding education. ESSA does not supersede IDEA in any way. In coming months, stakeholders in the

field will watch closely for the impact of ESSA on SWDs and the effect of the legislation on the yet to be reauthorized IDEA.

Implications of Educational Policies on Outcomes of Students with ID

Over the past two decades, high school graduation requirements have been revised by states in an attempt to improve student learning and address state mandated accountability standards (Johnson, Thurlow, & Schuelka, 2012). Ensuring these changes are effectively applied to SWDs has been noted as a challenge (Johnson et al., 2012). According to a survey conducted by the National Center on Educational Outcomes (NCEO) on the consequences of increased graduation requirements, twelve states reported that these changes may cause some SWD not to receive diplomas (Johnson & Thurlow, 2007). As noted in the National Longitudinal Study 2 (NLTS2), SWDs who do not receive high school diplomas have limited opportunities to pursue post-secondary education, which is noted in the NLTS2 High School Completion Fact Sheet (SRI International, 2005) as "critically important if youth with disabilities are to participate fully in an economy that is increasingly knowledge based" (p. 4). High school completion rates for students with ID match the high school completion rates found for students with all disabilities at 72% (SRI International, 2005).

Twenty-one states, including the District of Columbia, offer alternate diploma options only for SWDs (e.g., IEP or special education diploma, certificate of attendance, certificate of achievement, occupational or vocational diploma; Johnson et al., 2012). When states were surveyed on possible intended consequences of offering multiple or alternative diploma options for SWDs the most common response was an "increase in number of students within state receiving some form of high school diploma" (Johnson et al., 2012, p. 43). When asked about

possible unintended outcomes, states' first and second most common responses included limited access to post-secondary education and "alternative diploma options are viewed as substandard," respectively (Johnson et al., 2012, p. 44).

In light of survey findings, the NCEO recommends graduation and diploma requirements align to material SWDs learn while enrolled, and conversely that SWDs be given the opportunity to learn the material required for graduation (Johnson & Thurlow, 2007). When considering offering options other than a standard high school diploma for SWDs, stakeholders should take into account possible implications on access to postsecondary opportunities (Johnson & Thurlow, 2007). As development and reauthorization of current educational policies continue, it may be helpful for stakeholders to consider initiatives and frameworks designed to maximize postsecondary opportunities for SWDs and students without disabilities. College and career readiness, building of 21st century skills, and effective transition planning are three examples of principles that may be applicable in creating educational programs that prepare individuals with ID for successful employment following high school.

College and Career Readiness

College and career readiness was an initiative identified by the U.S. Department of Education (DOE) as the federal government began working towards reauthorizing ESEA as ESSA. Introduced in the 2010 report *A Blueprint for Reform*, the term college and career readiness refers to the goal of preparing every student to succeed in college and a career by high school graduation (DOE, 2010). The college and career readiness initiative applies to all students, including those with disabilities. Components of the college and career readiness movement include: (1) rigorous standards for all students, (2) assessments that effectively

measure college and career readiness standards, and (3) a curriculum that encompasses all content areas necessary in preparing students to contribute to a global economy (DOE, 2010). The principles of college and career readiness, including the initiative to prepare students to make valuable contributions to society, are reflected in the Framework for 21st Century Learning (The Partnership for 21st Century Skills, 2009).

Framework for 21st Century Learning

Developed by the Partnership for 21st Century Skills (P21; 2009), the *Framework for 21st Century Learning* is focused on the identification of requisite skills for student success in present and future society and workplaces. The mission of P21 includes the desire to build collaborative partnerships among education, business, community and government leaders, where learners can gain the knowledge they need for continued success in an ever-changing world. Some of P21's collaborative partners include: American Federation of Teachers, Apple Inc., Common Sense Media, Education Networks of America, Ford Motor Company Fund, Future Problem Solving Program International, Gale Cengage Learning, Intel Corporation, National Board for Professional Teaching Standards, National Education Association, PBS, Pearson, and The Walt Disney Company.

Within the requisite skills for success, the Framework for 21st Century Learning includes ideas reliant on higher order thinking and reasoning skills, identified within the framework as integral to success in the careers of today and tomorrow (P21, 2009). The framework, shown in Figure 3, is comprised of student outcomes and supports to facilitate student mastery of the outcomes (P21, 2009). The framework contains three skill sets: (a) Learning and Innovation Skills, also referred to as the 4C's; (b) Life and Career Skills; and (c) Information, Media, and

Technology Skills. Learning and Innovation Skills include (a) critical thinking, (b) communication, (c) collaboration, and (d) creativity, and are referred to by P21 (2009) as the skills that mark students as prepared for complex 21st century life and work environments. Life and Career Skills extend beyond content knowledge, emphasizing adaptability, leadership, social skills, and responsibility. Lastly, Information, Media, and Technology Skills refer to the way future leaders adapt to, interact with, employ, and evaluate rapidly changing technology (P21, 2009).

Although the Framework for 21st Century Learning is designed for all students, skills and learning principles highlighted in the framework can be aligned to recommended elements contributing to lifelong success of individuals with ID. Such alignment includes noted deficits for people with ID in problem-solving (Livermore & Goodman, 2009) and communication (Alber et al., 1999; Kroeger & Nelson, 2006; La Greca et al., 1982). One way to address these skills as individuals with ID prepare for post-secondary outcomes may be through transition planning.

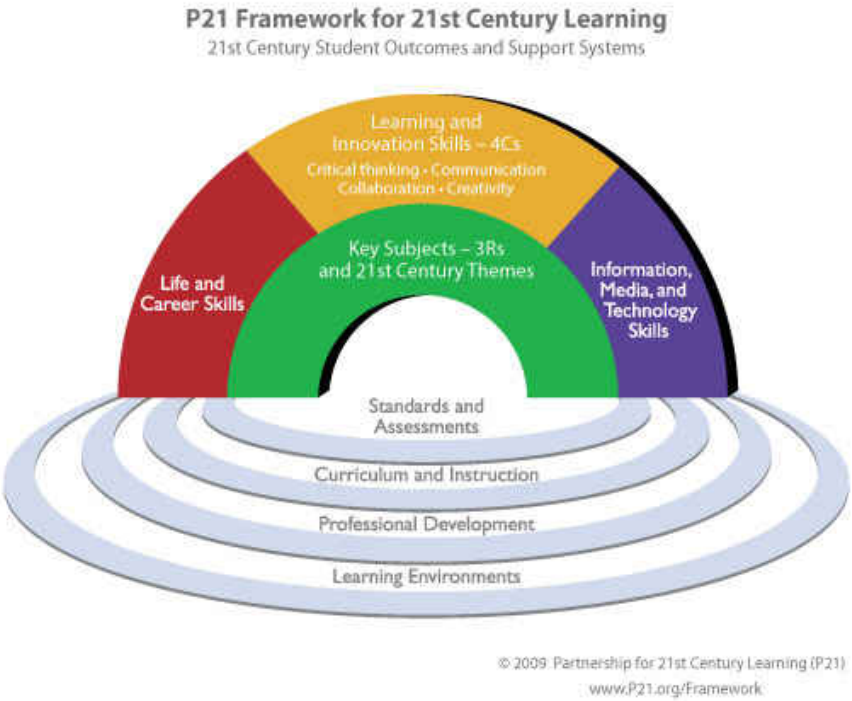


Figure 3: Framework for 21st Century Skills
(used with permission, see Appendix G)

Transition Planning

The 1990 reauthorization of IDEA included the first introduction to transition planning. Transition planning was defined as the identification of goals related to post-secondary outcomes (i.e., objectives for education, work, and living beyond high school) and activities to help students meet those objectives. Transition planning was to be included in students' IEPs beginning at the age of 16. The mandate for transition planning continued through subsequent reauthorizations of IDEA in 1997 and 2004.

Taxonomy for Transition Programming

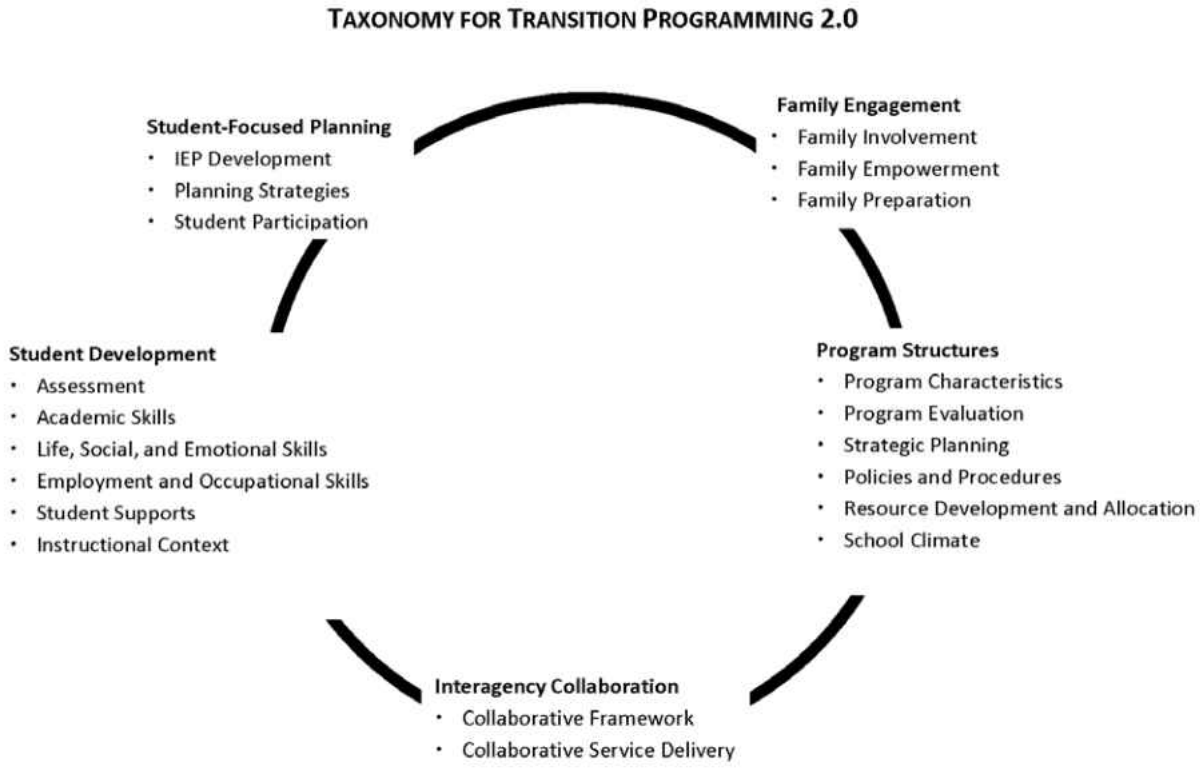
Designed as a foundation for the development of transition programs and activities, Kohler's (1996) *Taxonomy for Transition Programming* was identified to link research on

successful transition programing to practices carried out for the benefit of students and their families. The taxonomy was developed based on transition practices identified through previous studies of transition programming and practices (Kohler, 1996). The practices were organized into categories and experts in the field of transition were recruited to identify the items they viewed as best practice, and add any additional items they felt should be included. The experts were then asked to rate the importance of each practice on an updated list (Kohler, 1996). The following categories were used to classify the identified transition practices within the taxonomy: (1) student-focused planning, (2) student development, (3) interagency and interdisciplinary collaboration, (4) family involvement, and (5) program structure and attributes; within categories, practices were further organized into clusters based on similarity as identified by the expert raters (Kohler, 1996). Practices in the *Taxonomy for Transition Programming* framework continued to prove relevant and represent a student and family-centered model to help students and their families prepare for post-secondary transition over time (Kohler & Field, 2003).

The taxonomy has been newly revised as the *Taxonomy for Transition Programming 2.0* depicted in Figure 4 and was recently disseminated (Kohler, Gothberg, Fowler, & Coyle, 2016). Based on Kohler's earlier work, the revised taxonomy reflects societal advances occurring since the original taxonomy was established. The *Taxonomy for Transition Planning 2.0* incorporates current literature and practices; however, the categories remain the same (Kohler et al., 2016).

The model represented within the taxonomy can be used to ensure that students with ID have opportunities to build the skills included in the Framework for 21st Century Learning (P21, 2009). The framework, when combined with the *Taxonomy for Transition Programming 2.0* may help address gaps noted in social problem-solving communication of individuals with ID (e.g.,

Alber et al., 1999; Kroeger & Nelson, 2006; La Greca et al., 1982; Livermore & Goodman, 2009).



Kohler, P. D., Gothberg, J. E., Fowler, C., and Coyle, J. (2016). *Taxonomy for transition programming 2.0: A model for planning, organizing, and evaluating transition education, services, and programs.* Western Michigan University. Available at www.transitionta.org.

Figure 4*:* Taxonomy for Transition Programming 2.0
(used with permission, see Appendix H)

Employment for Individuals with Disabilities

This section includes historical and current legislative items pertinent to employment outcomes that parallel educational legislation for individuals with disabilities, including those with ID. Legislation is addressed by item, with each section describing the original authorization of the item and any reauthorizations.

Soldier's Rehabilitation Act of 1918

Enacted during World War I, the Soldier's Rehabilitation Act provided vocational training to veterans who could not engage in their previous employment due to injuries sustained while serving in the war. Programs prompted by this legislation were administered by the Federal Board for Vocational Education, already in place to oversee vocational programing offered through educational institutions.

Civilian Vocational Rehabilitation Act

Also known as the Smith-Fess Act, the Civilian Vocational Rehabilitation Act enacted in 1920 followed the Soldier's Rehabilitation Act of 1918 by establishing vocational rehabilitation programs for civilians with physical disabilities. Funds provided to states under the Civilian Vocational Rehabilitation Act were available for the provision of vocational guidance, training, occupational adjustment services, and job placement for civilians who were not able to continue in their current occupation. Initially the federal government matched program funds with states 50:50. The Civilian Rehabilitation Act was not a permanent legislative item when first enacted; instead, program sustenance required periodic reauthorization from Congress. The Social Security Act was enacted in 1935 containing language to appropriate permanent federal funding for vocational rehabilitation.

The Barden-LaFollette Act represented a reauthorization of the Vocational Rehabilitation Act passed in 1943, with an important expansion in the provision of vocational rehabilitation services for potential employees with disabilities. Service opportunities were expanded to individuals with ID and psychiatric disabilities; these services were expanded by 1954 amendments of the Vocational Rehabilitation Act. The Barden-LaFollette Act also authorized

funding for physical restoration and maintenance for clientele demonstrating financial need and further expanded vocational rehabilitation services for people with visual impairments.

The Civilian Vocational Rehabilitation Act was amended in 1954 to change the federal to state ratio to 60:40 and again in 1965 to shift the ratio further to 75:25. Federal funding amounts were increased in the 1954 amendments. The 1965 amendments introduced an evaluation period to determine if individuals with more severe disabilities may benefit from services. The evaluation period allowed states to provide services to clientele with more severe disabilities before formal program acceptance. Also within the 1965 amendments, vocational rehabilitation services were extended to individuals with emotional disabilities as identified by a psychologist or psychiatrist.

Randolph-Sheppard Act and Wagner-O'Day Act

Two legislative items enacted in the 1930s applied to individuals with the specific disability of visual impairment. The Randolph-Sheppard Act, enacted in 1936 permitted individuals with visual impairments to operate vending stands on federal property. Also through the Randolph-Sheppard Act a study was authorized to explore occupational options for individuals with visual impairments. Two years later in 1938 the Wagner-O'Day Act was enacted. The Wagner-O'Day Act set forth requirements that certain products used by the federal government be purchased exclusively from workshops for individuals with visual impairments.

Rehabilitation Act of 1973

The Rehabilitation Act of 1973, passed only two years before EAHCA mandated educational opportunities for SWDs, refined the focus of vocational rehabilitation programs, prioritizing services for individuals with the most severe disabilities. Language in the act

emphasized a person-centered approach to vocational rehabilitation service provision, requiring input and involvement of individuals receiving services. Further research on vocational rehabilitation and evaluation of existing programs was included, as well as grants to benefit supported employment and independent living support through the Rehabilitation Services Administration.

Sections 501 and 503 in the Vocational Rehabilitation Act of 1973 applied specifically to employment within organizations and programs receiving federal funds, encompassing federal employment, employment with federal contractors, programs conducted by federal agencies, and programs receiving federal financial assistance. Non-discrimination was required within the hiring process, including a written affirmative action plan for the federal government and larger contractors. The Vocational Rehabilitation Act of 1973 also established guidelines for determining discrimination. Equitable access to public services for individuals with disabilities was established in sections 502 and 504 of the Vocational Rehabilitation Act of 1973. The former established a board to oversee accessibility of federal buildings and public transportation, while the latter prohibited discriminatory access to public programs and services, including but not limited to hospitals, welfare offices, and schools.

The Rehabilitation Act was amended in 1978, authorizing a separate program dedicated to helping individuals with disabilities build independent living skills. The act was further amended in 1984 and 1992. The 1992 amendment further emphasized the importance of and regulated individualized planning using input from the individual receiving services (National Council on Disability, 2008). The 1992 amendment of the Rehabilitation Act came shortly after the 1990 reauthorization of IDEA and the 1990 passage of ADA.

Americans with Disabilities Act

When enacting the ADA in 1990, the federal government acknowledged that discrimination against people with disabilities in the United States continued, frequently with lack of recourse (U.S. Equal Opportunity Employment Commission, n.d.). In terms of employment, ADA prohibited discrimination against qualified individuals with disabilities in any facet of employment (e.g., hiring, promotion, training, discharge). The legislation also required employers to make reasonable accommodations for employees with disabilities on the job and during skill testing.

Workforce Investment Act

The Workforce Investment Act (WIA) was enacted in 1998 as a reauthorization of the Rehabilitation Act. The WIA created opportunities for adults, dislocated workers, and youth to train for, achieve, and persevere in competitive employment. The Workforce Investment Act contained specific language to direct employment services to clients who are low income, those who receive welfare, and in some cases veterans and their spouses. The WIA appropriated funds for the synthesis of already existing rehabilitation services and job training programs. One-stop Career Centers, offering training, preparation, interviewing skill building, and placement services, were funded to provide the services mandated in WIA.

Workforce Innovation and Opportunity Act

The importance of employment opportunities for individuals with ID has gained national discussion with the 2014 enactment of the Workplace Innovation and Opportunity Act (WIOA). Just as NCLB set high standards for all learners, the purpose of WIOA, an amendment to WIA, was to improve access to employment for individuals in the U.S., especially those with barriers

to employment, with an emphasis on people with disabilities. Individuals seeking employment have improved access to training, career counseling, job search and placement services, and other employment related supports, with a more streamlined approach based on the needs of individual participants. One focus of WIOA is to improve physical and curricular accessibility to employment training.

Support of employment outcomes for people with disabilities has increased as evidenced by legislative action taken throughout the 20th and into the 21st centuries as well as educational initiatives for all learners such as college and career readiness (U.S. DOE, 2010) and the Partnership for 21st Century Skills (2009). The trend of federal incentives to facilitate employment for people with disabilities began in the early 1900's with legislation specifically for U.S. veterans; this legislative trend progressed, next encompassing individuals with visual impairments, before finally including people with cognitive impairments such as ID.

Current Employment Trends for Individuals with ID

According to the U.S. Department of Labor (DOL; Bureau of Labor Statistics, U.S. DOL, 2015), only 26% of 16 to 64 year olds with disabilities were employed in 2014. In comparison the DOL found that approximately 72% of adults in the same age group without disabilities meeting the same criteria were employed. While the U.S. DOL does not collect data on specific disability categories, analysis of data from the NLTS2, a longitudinal data study focused on young people with disabilities confirmed the fact that employment rates of young adults with ID are not comparable to those of the general population (Newman et al., 2011). Newman and colleagues (2011) reported on the NLTS2 findings comparing educational attainment of young adults with disabilities using the following categories: (a) not completing high school, (b)

completing high school, (c) attending some postsecondary education, and (d) completing postsecondary education. Based on the NLTS2 data, Newman and colleagues reported that percentages of young adults employed at the time of the interview, or at any time since completing high school, increased based on participants' highest level of educational attainment.

Problem-solving Communication Skills for Employment of Individuals with ID

One barrier individuals with ID face in obtaining employment is the lack of job-related skills, including deficits in communication and social problem-solving skills (Livermore & Goodman, 2009). As defined by the AAIDD, social problem-solving is within the set of *social skills* (Schalock et al., 2010). Social skills are one of the three dimensions of adaptive behavior, the collection of competencies in which a person must show deficits in order to be classified as having an ID (Schalock et al., 2010). Johnson, Mellard, and Lancaster (2007) posited that learning the social interaction skills related to employment were a key factor in facilitating successful employment outcomes for individuals with learning disabilities. The importance of workplace-related social skills may also hold true for those with ID. Appropriate social interactions are not always naturally reinforced in the workplace (Alber et al., 1999).

However, several examples in current literature emphasize the importance of social communication to successful employment outcomes. Foley and colleagues (2013) identified a correlation between well-developed communication skills and independent employment outcomes for young adults with ID. In a study of young adults with ID, those functioning higher in the area of communication skills were more likely to be engaged in independent employment than those with lower communication skills (Foley et al., 2013). According to Morningstar and Mazzotti (2014), "behaviors and attitudes that facilitate communication and cooperation,"

including “social problem-solving” (p. 57), within the realm of social skills were identified as beneficial to employment and post-school success for individuals with all disabilities. Kohler’s (1996; 2016) research provides the Taxonomy for Transition Programming which classifies work-related behaviors and skills as social skills to be addressed in the fostering of student development.

Alternative methods to develop workplace social communication are needed for individuals with ID to become productive members of our 21st century society (Elias & Clabby, 1992; Gear et al., 2011). Social communication skills within the workplace are aligned with the Learning and Innovation Skills included in the Framework for 21st Century Learning (P21, 2009). Relevant elements include (1) communication, (2) collaboration, and (3) critical thinking.

Verbal and Nonverbal Communication

Communication is comprised of both verbal and nonverbal behaviors. As described in the Framework for 21st Century Learning definitions (P21, 2015), effective communication includes the ability of students to expresses themselves orally and nonverbally in addition to being receptive to communication from others. Appropriate verbal responses and communication are important for individuals with disabilities to be successful in integrated settings (Alber et al., 1999). A workplace is an example of an integrated setting. Failure to respond appropriately can lead to social isolation of individuals with severe disabilities and reduce the likelihood of future communication (Nientimp & Cole, 1992). When attempting to increase the workplace social communication skills of an individual with ID, Gear, Bobzien, Judge, and Raver (2011) promoted “giving appropriate verbal responses to directions, feedback, or criticism” (p. 41).

Nonverbal communication includes all elements of communication not dependent on words (Matsumoto & Hwang, 2013b). During a conversational exchange, 65% to 95% of information is communicated nonverbally (Matsumoto & Hwang, 2013b). Despite the prevalence of nonverbal communication these skills are not frequently addressed in education or workplace training (Langford, 2013; Matsumoto & Hwang, 2013b). Gear and colleagues (2011) targeted the nonverbal objectives of maintaining eye contact and not attempting to speak while the authority figure was speaking when addressing the need for improved workplace social skills with a young woman with ID. In the U.S., looking directly at the person with whom you are speaking is regarded as a sign of respect (Matsumoto & Hwang, 2013a). A speaker who orientates his or her body towards the conversational partner, and keeps open (i.e., uncrossed) arms and legs communicates a positive, open attitude (Matsumoto & Hwang, 2013a). Finally, voice, an element that is seemingly verbal in nature, conveys nonverbal messages as well (Frank, Maroulis, & Griffin, 2013). Increased volume, pitch, and rate of speed was found to be a universally reliable indicator of anger and happiness, whereas decreases in pitch and loudness can reliably indicate sadness, with less reliable associations to contempt and disgust (Frank et al., 2013).

Increasing Problem-Solving Communication and Employment Outcomes for Individuals with ID

In current literature there are several examples of research studies targeting workplace behaviors and transition skills leading to workplace success. Using the following search terms: “intellectual disability,” “Mental retardation,” “disabilities,” “job,” “employment,” “employment training,” “job training,” “communication skills,” “social skills,” and “problem-solving skills,” the researcher identified 14 studies related to this objective. Each study is summarized in Table

1. Twelve studies included participants with ID, two studies were included in the table despite including participants with disabilities other than ID, the researcher considered them notable for the use of role play (Alber et al., 1999) and a peer trainer (Nientimp & Cole, 1992) to increase appropriate social interactions. All but one identified study examined the effects of interventions using a single-subject research design. Multiple elements represented across studies may be considered as intervention to increase workplace problem-solving communication for individuals with ID.

Using Peer Interaction to Build Communication Skills for Individuals with ID

Peer interactions promote learning and relationships, and improve quality of life for individuals with disabilities (Carter et al., 2010). Carter and colleagues (2010) noted these types of interactions are more challenging to study in individuals with low-incidence disabilities (e.g., ID) and are rarely studied beyond elementary school age. Test, Fowler, White, Richter, and Walker (2009) noted a potential evidence base for building social skills as a predictor of educational outcomes for SWD based on one study with medium and large effect sizes. Social skills were also established as a potential predictor of employment for individuals with disabilities based on two studies (Test et al., 2009). Rusch, Wilson, Hughes, and Heal (1994) noted that co-workers without disabilities often took on the role of trainer for peers with disabilities in workplace settings. Additionally, co-workers without disabilities may serve as a natural support for building social skills (Chadsey & Beyer, 2001; Chadsey et al., 1999).

Three studies identified by the researcher incorporated peers without disabilities in interventions, each with an objective of increasing appropriate social interactions. Hughes and colleagues (2011) provided opportunities for young adults with ID to interact with peers without

disabilities while using communication books and found increased conversational initiations by all participants. Mautz, Storey, and Certo (2001) studied the effects of a peer providing natural support in the workplace to a man with multiple disabilities including ID and found that while no single strategy was effective, a combination of peer support, a communication device, and training for the man's job coach increased appropriate social interactions. Nientemp and Cole (1992) trained peers without disabilities, had them act as trainers for middle school students with autism and found increased appropriate social responses for all participants, with two participants demonstrating maintenance after the intervention ended.

In a review of interventions for social interaction skills for individuals with ID, Hughes and colleagues (2012) found no studies using peers as trainers to address social problem-solving. Additionally, there is a noted deficit of transition-focused intervention studies for individuals with ID conducted beyond elementary school (Carter et al., 2013). Hughes and colleagues identified only one study using peers as conversational partners in social skills instruction; they hypothesized this scarcity may have been due to hesitation of placing a peer in a role as an instructor to an individual with a disability. However, inclusion of a peer figure as a trainer may in fact improve the outcome of a social interaction intervention for all students (Ginsburg-Block et al., 2006).

Role Play as an Intervention for Individuals with ID

Role play can be used to build social competence for individuals with ID by incorporating direct modeling and opportunities for appropriate social interaction (Shepherd, 2009). In role play, a situation is described to the participant, then he or she describes or acts out a response to the scenario (Bielecki & Swender, 2004). Structured role play has been shown to

improve workplace social communication skills for a person with ID (Gear et al., 2011). According to Bielecki and Swender (2004) role play is one of the most common methods used to assess social skills of individuals with ID. Workplace-related role play can help potential employees learn social behaviors (Foy et al., 1979).

The researcher identified two recent studies in which role play was part of the intervention. Middle school students with ID demonstrated an increase in problem-solving skills when participating in an intervention that included role play (Cote et al., 2010). Gear and colleagues (2011) studied the effects of role play on the workplace social communication of a woman with ID and found improved skills following the intervention.

Technology for Individuals with ID

Technology has been implemented for SWDs for many years, with a pertinent example being assistive technology, such as alternative augmentative communication devices that have long improved the functioning of some SWDs (Edyburn, 2013). In the future of special education, applications of new technology are shifting away from assistive technology to a wider more comprehensive view of instructional technologies (Edyburn, 2013). With recent technological developments there is increased interest in applying new technologies to support learning for individuals with ID (den Brok & Sterkenburg, 2015). An important consideration as technology rapidly changes is the need for continued research into the effectiveness of these developments. Edyburn (2013) cautions that amid the enthusiasm to apply emerging technologies, research into effectiveness and optimized application is frequently overlooked.

The researcher identified three studies containing interventions including video technology specifically. Collins, Ryan, Katsiyannis, Yell, and Barrett (2014) used task analyses

to increase the correct completion of job tasks for post-secondary program participants with ID. Audio, video, and audio/video modes of presentation were used, all were successful, but the audio/video versions were preferred by participants (Collins et al., 2014). Goh and Bambara (2013) used video self-modeling with adults with ID in a supported employment program to increase successful completion of chained job tasks. Video self-modeling was effective when combined with feedback and opportunities for practice (Goh & Bambara, 2013).

Another application of technology, virtual reality (VR) has been researched as a rehabilitative intervention for individuals with ID (Standen & Brown, 2005). Standen and Brown (2005) found studies with results indicating potential benefits from the use of VR to build both social skills and career skills. Researchers den Brok and Sterkenburg (2015) noted similar evidence of the application of technology to support learning for individuals with ID. They identified VR as having the most features to support learning, referring to the interactive nature and adaptability of many VR applications (den Brok & Sterkenburg, 2015). Mechling and Ortega-Hurndon (2007) found success using computer-based video instruction in a simulated environment to teach job tasks to three adults with ID.

Cheng and Chen (2010) developed and studied an application of VR to improve social emotional competence in children with ID. Using a single case design, the researchers noted improvements in social emotional competence in each participant (Cheng & Chen, 2010). Eden and Bezer (2011) found VR with students with ID had a positive influence on learning with less requirement of mediation from an instructor or other outside party when compared to animated 2-dimensional instructional materials. Cobb (2007) summarized and discussed the positive impact of four VR-based interventions on communication skills for SWD. She noted the importance of simulating a real-life experience, especially to meet the goal of a constructivist

learning experience (Cobb, 2007). Cobb also emphasized the need to ensure engagement with the VR experience was no more difficult than engagement in the real-life situation being simulated. Passig (2009) found practice in a virtual environment improved time perception for children and young adults with ID. Tam, Man, Chan, Sze, and Wong (2005) used VR practice to help young adults with ID improve daily living skills and found changes in pre-post assessments with no decline in task performance when generalized. Virtual environments can be used to create rehearsal opportunities of social scenarios for people with disabilities (Cobb, 2007). Virtual worlds allow researchers and instructors of individuals with ID to control a situation, arranging for targeted learning experiences (Standen & Brown, 2005).

TeachLivE™

The TeachLivE™ (TLE) virtual classroom offers teachers the opportunity to develop and practice integral classroom management and instructional skills in a low-stakes environment with virtual student avatars. Developed and based at the University of Central Florida (UCF), TLE has provided mixed-reality virtual experiential learning opportunities to educators for the past decade (Dieker et al., 2014). Virtual avatars in TLE are controlled by a human "interactor" (Dieker et al., 2008, p. 11). Interactors work within the developed characteristics of an avatar, but improvise when interacting with participants to facilitate a life-like and realistic experience (Dieker et al., 2008). Communicating with an avatar may reduce the social barriers sometimes present when people with disabilities communicate with peers (Stendal et al., 2011). Some studies reviewed by Hughes and colleagues (2012) indicated the use of a virtual trainer facilitated improved generalization of target communication skills across settings.

Researchers studying TLE technology have indicated that behaviors can be positively shaped with as little as four, 10-minute sessions in the virtual classroom based on findings from a national study of 157 middle school math teachers across 10 research sites (Straub et al., 2014). The benefit of the TLE environment for K-12 students to interact with virtual students in the TLE environment showed potential when explored by the researcher in spring and summer 2014 (Bukaty, 2014). The virtual classroom was used to help 4th to 6th grade students build phonics skills; in addition to receiving academic reinforcement, students showed increased engagement and motivation. A demonstration of the original peer avatar model can be found at: https://www.youtube.com/watch?v=XA--PtQtm1c and is depicted in Figure 5 (Bukaty, 2014).

Figure 5: TeachLivE™ Peer Avatar Model

Chapter Summary

Effective social problem-solving communication is necessary for success in many workplace settings. Individuals with ID often struggle with appropriate social problem-solving skills (Livermore & Goodman, 2009; Schalock et al., 2010). Despite the importance of these skills, some elements of social problem-solving communication are not regularly addressed or reinforced in educational or workplace training settings (Alber et al., 1999; Langford, 2013; Matsumoto & Hwang, 2013b). Development of new interventions to increase workplace social communication and problem-solving for young adults with ID is indicated (Elias & Clabby, 1992; Gear et al., 2011).

Several elements have proven to be effective in past research surrounding skill building for individuals with ID. Interacting with peers supports learning (Carter et al., 2010). Several studies revealed the positive effects of peer support (Hughes et al., 2011; Mautz et al., 2001; Nientimp & Cole, 1992). Role play increases opportunities for people with ID to practice appropriate workplace interactions (Shepherd, 2009). Finally, innovative technology, specifically practice within virtual environments, has been shown to improve living skills (Tam et al., 2005) and can be used to address social skills (Cobb, 2007) for individuals with ID.

To address the need for new interventions the researcher developed an intervention synthesizing established components of successful workplace problem-solving communication with emerging technology. The researcher will examine the impact of role play rehearsal with a virtual peer in a mixed-reality environment on the ability of individuals with ID to engage in a problem-solving conversation with a virtual supervisor in a mixed-reality virtual environment.

CHAPTER THREE: METHODS

Introduction

This chapter includes an overview of the study to examine the effects of a workplace problem-solving communication skills intervention for individuals with intellectual disabilities (ID). The rationale for the study, theoretical frameworks, research questions, variables, and hypotheses are described. The researcher then describes the population included in the study, participant recruitment and selection procedures, and the settings in which the research study was conducted. The intervention components and procedures followed to carry out the intervention are detailed, along with the research timeline. Finally, the researcher describes data collection procedures and assurances of reliability and validity.

Problem and Rationale

The lack of problem-solving skills within the realm of social communication in individuals with ID negatively impacts the ability to find and maintain gainful employment for members of this population. Lower rates of employment and postsecondary education for individuals with ID when compared to peers without disabilities and those with other disabilities as reported from the National Longitudinal Transition Study 2 (NLTS2) data (Newman et al., 2011) may indicate a need for specific workplace problem-solving skill-building instruction as a part of transition education and services. Current researchers suggest improved social

communication may help individuals with ID become productive members of society (e.g., Carter et al., 2013; Gear et al., 2011; Livermore & Goodman, 2009). This study was conducted to examine the effects of In-FORCE (Innovative Facilitation of Requisite Communication Skills for Employment), a potential intervention to improve problem-solving communication needed in the workplace for individuals with ID.

Theoretical Frameworks

Two theoretical frameworks were used in support of the development of the study. First, the *Framework for 21st Century Skills* defines the skills and knowledge needed for all students to progress successfully into adult life (The Partnership for 21st Century Skills, P21, 2009). The second, Kohler, Gothberg, Fowler, and Coyle's (2016) *Taxonomy for Transition Programming 2.0*, provides a framework for designing transition-based educational opportunities to improve post-secondary outcomes of SWD. The taxonomy represented a recently updated iteration of Kohler's past work, published in 1996. The combined frameworks address the social interaction (P21, 2009) and preparation for employment skills (Kohler, 1996; Kohler et al., 2016) that may aid in closing the gaps revealed in the NLTS2 and National Center on Educational Outcomes (NCEO) survey data.

Within the study, the objectives used to measure In-FORCE outcomes were directly aligned to student outcomes identified in the *Life and Career Skills* and *Learning and Innovation: Critical Thinking and Problem Solving* strands of the Framework for 21st Century Learning. The Life and Career Skills strand was built on the understanding that basic thinking and content knowledge must be greatly expanded for students to thrive in today's complex life and work environments (P21, 2009). Learning and Innovation Skills, with a focus on critical

thinking and problem-solving, address the need for students to use reasoning and problem-solving when faced with decisions and dilemmas throughout their lives and careers (P21, 2009). The alignment is illustrated in Appendix B. Participants in the study also experienced elements of the *Information, Media, and Technology* strand (P21, 2015) as they engaged with newly emerging simulation technology and video during the pretest, posttest, and intervention sessions.

The In-FORCE intervention, administered in the study, addressed practices in the category of student development within the *employment and occupational skills,* and *life, social, and emotional skills* subcategories of Kohler and colleagues' (2016) Taxonomy for Transition Programming 2.0. Some practices from the taxonomy were directly aligned with the problem-solving objectives included in the *In-FORCE Problem-solving* checklist as described in Appendix B, including: from the employment and occupational skills subcategory (a) soft skills development; and from the life, social, and emotional skills subcategory (b) self-determination skills development; and (c) social skills development. Other practices addressed in the intervention, but not directly aligned to specific problem-solving objectives in the assessment instrument included (a) interpersonal skills development, from the life, social, and emotional skills subcategory; (b) assessment results shared regularly (in the form of feedback from the peer avatar), from the assessment subcategory, (c) peers to build and support career aspirations (i.e., the peer avatar), from the student supports subcategory, and (d) instruction embedding Universal Design for Learning, from the instructional context subcategory.

Purpose, Pilot Study, and Research Questions

In the study the researcher tested the effectiveness of the In-FORCE intervention to address the need for improved verbal and nonverbal problem-solving skill-building instruction

for young adults with ID. The intervention represented the synthesis of newly developed technology and a workplace skills curriculum developed by the United States (U.S.) Office of Disability Employment Policy (ODEP; n.d.). Individuals with ID in the treatment group participated in mixed-reality interactions where they discussed a workplace problem scenario with a virtual peer avatar in preparation for a problem-solving session with a virtual supervisor avatar. The In-FORCE intervention targeted the specific skills of solving a problem with a supervisor.

To validate this intervention with individuals with ID the researcher conducted a pilot study in the spring of 2015 (Bukaty, 2015). The pilot study was carried out using a single subject, repeated acquisition design. Seven young adults with ID participated in the study; three were recruited through affiliation with a local advocacy organization for individuals with ID and four participants were recruited as part of a school group. Participants from the advocacy organization interacted with virtual avatars using six problem scenarios; each participant experienced the same six scenarios. Participants from the school group interacted with virtual avatars using five problem scenarios due to time constraints. Each participant in the school group experienced the same five scenarios; the scenarios were the first five of the six used with the participants recruited from the advocacy organization.

Following a training and introduction session, each participant had three meetings with virtual avatars about each scenario; the first with the supervisor avatar, the second with the peer avatar, and the third meeting with the supervisor avatar again. During each meeting, the researcher evaluated participants' problem-solving using the *In-FORCE Problem-Solving Checklist* (see Appendix F). Participants also completed the *Perception of In-FORCE Training* survey (see Appendix C) after completing all problem scenarios.

Initial findings from the pilot study data included increases in achievement of some problem-solving criteria, more dramatically in the area of verbal problem-solving behaviors (Bukaty, 2015). The researcher noted many participants achieved the nonverbal objectives from the initial session. In some cases, after several sessions, participants' achievement of nonverbal objectives, such as body position, decreased. Participants' decreased achievement of nonverbal objectives may have been a result of the participants' increased comfort and established rapport with the avatars. To examine this occurrence more closely in this study, the researcher examined verbal and nonverbal objectives independently, a measure not conducted in the pilot study. Analysis of initial problem-solving checklists completed by two observers revealed inter-observer reliability greater than 80%.

The pilot study allowed the researcher to validate six problem scenarios with a group of young adults with ID. Of the six scenarios used in the pilot study, one was agreed upon as being more abstract than the others by the researcher, two research associates, and an interactor. For the present study, the five successfully validated scenarios were used along with an alternate scenario, selected from the other 15 scenarios previously created. This alternate sixth scenario was validated by a young adult identified as having an ID during the establishment of the procedures when the researcher created a video for demonstration purposes.

To measure the effectiveness of the In-FORCE Workplace Problem-Solving Intervention, the researcher conducted a group design study addressing the following research questions: RQ1: To what extent do In-FORCE problem-solving intervention sessions increase the abilities of young adults with ID to implement verbal workplace problem-solving skills, as measured by the rate of independently achieved objectives in a problem-solving checklist based on standards

from the U.S. Department of Labor (DOL) Secretary's Commission on Achieving Necessary Skills (SCANS; 1991)?

- Independent variable: In-FORCE problem-solving intervention sessions
- Dependent variable: Rate of independent achievement of verbal workplace problem-solving objectives during problem-solving sessions with a virtual supervisor
- Hypothesis: Participation in In-FORCE problem-solving intervention sessions will increase independent participant achievement of verbal problem-solving objectives with a virtual supervisor

RQ2: To what extent do In-FORCE problem-solving intervention sessions increase the abilities of young adults with ID to implement nonverbal workplace problem-solving skills, as measured by the rate of independently achieved objectives in a problem-solving checklist based on standards from the U.S. DOL SCANS (1991)?

- Independent variable: In-FORCE problem-solving intervention sessions
- Dependent variable: Rate of independent achievement of nonverbal workplace problem-solving objectives during problem-solving sessions with a virtual supervisor
- Hypothesis: Participation in In-FORCE problem-solving intervention sessions will increase independent participant achievement of nonverbal problem-solving objectives with a virtual supervisor

Participants

For the purpose of this study, individuals with ID were classified as: any individual age 16 or older at the start of the research activities, who has or had an educational classification of

ID, or the previously used term mental retardation, and no other co-existing disabilities based on self or parent/ guardian report. Individuals with ID were selected as the target population due to the documented deficits in communication skills and lacking employment outcomes for members of this population.

Inclusionary Criteria

Prior to the start of the study, inclusionary criteria for this research were defined as: (1) a classification of ID and (2) age 16 or older. Potential participants were excluded if they had: (1) a dual diagnosis of another educational disability (e.g., autism) or (2) previously participated in research activities in the TeachLive™ (TLE) environment.

Power Analysis

Initially the researcher sought to recruit 46 participants total from across recruitment avenues. The target sample size of 46 was determined based on the results of a priori analyses conducted using G*Power 3.1 for statistical significance when conducting a repeated measures analysis of variance (ANOVA) with one factor between for a moderate effect size with an alpha level of 0.05 and power set to 0.8. This number of participants was 35% higher than the G*Power 3.1 a priori analysis for a repeated measures ANOVA ($n = 34$). The over sampling was intended to preserve statistical power in the event of attrition. Although the actual number of participants completing the study ($n = 42$) did not meet the recruitment target, it still exceeded the number of participants indicated in the a priori power analysis by more than 23%.

Recruitment

Recruitment began after the researcher obtained approval to conduct the study from the UCF Institutional Review Board (IRB, see Appendix I). Participants were respondents to

recruitment efforts, yielding a convenience sample. Avenues for recruitment included organizations serving individuals with ID and school districts across the Central Florida area. Recruitment efforts included word-of-mouth contact with organization administrators and school district personnel. The researcher created an informational flyer to inform potential participants and their families about the study. The flyer was provided to recruitment contacts for dissemination. Recruitment contacts included career counselors at school districts and human services organizations, advocates for young adults with ID, and service providers who interact with young adults with ID. The flyer included contact information for the researcher, including a phone number and dedicated e-mail address (see Appendix J).

A total of 42 individuals participated in the entire study. In the demographic survey, participants were asked to disclose their ages, which ranged from 16 to 65. Two participants chose not to disclose age. There were 19 male participants and 23 female participants. In addition to those who completed the study, six participants were not responsive or unable to commit to research sessions following the consent process, three were deemed ineligible based on communication skills during the meet-and-greet session, and two participants began, but did not finish the research activity portion of the study. Both participants who did not finish the study were attendees of the adult day program; one stopped attending the program for a period of time following a medical procedure and another chose not to leave a preferred activity during times the research sessions were scheduled, as participation in the study was completely voluntary.

Consent Process

Some participants were minors and some were of legal age; those who held their own legal guardianship and were not recruited as part of a school district group completed the consent process independently using the consent form provided in Appendix K. This form was developed based on the consent form approved by the UCF IRB for similar research activities conducted with participants meeting the same parameters as part of a pilot study of this intervention in spring of 2015. Participants who were minors or those who did not hold their own legal guardianship, and participants who were recruited as part of a school district group needed parental consent to participant. One parent or guardian was asked to consent to the individual's participation, and the individual was asked to provide assent. The parental consent procedure for all participants recruited from school groups regardless of their status of guardianship was established based on procedures required by the local school district for student participation in the pilot study conducted in relation to this research. Documents for parental consent and participant assent for participants age 18 and over who were unable to provide consent for themselves can be found in Appendices L and M respectively, and were modeled after documents approved by both the UCF IRB and the Director of Research of the school district from which participants for the spring 2015 pilot study were recruited. An additional consent form was created for parents or guardians of minors who were providing consent for participation of a child under the age of 18, included in Appendix N. Participants under the age of 18 used the same assent form created for older participants whose parent or guardian provided consent, included in Appendix M. Members of the research team read and explained the consent documents as requested by participants and families.

Participant Assignment

Participants were randomly assigned to the treatment and control groups in equal numbers initially, though an imbalance occurred due to attrition. Participants were assigned to either the treatment or control group using a matching procedure. Participants were matched into pairs based on the composite score result of the Transition Assessment and Goal Generator, Student Version (TAGG-S).

One member of each pair was randomly assigned to each group. Use of the matching procedure was critical due to the diversity of the population of individuals identified using the label of ID. This procedure was put into place to ensure maximum homogeneity between the treatment and control groups in this study. Matching was used to increase equivalency in the treatment and control groups to strengthen the research design.

The information to complete the matching procedure was collected using each participant's composite score on the TAGG-S, administered to participants upon the completion of the consent process. Participants were permitted to ask anyone they choose for assistance in completing the assessment if needed. Members of the research team assisted participants in completing the survey on the computer, or verbally if requested. Composite scores were tabulated automatically within the TAGG platform and were reported on a 9-point scale. The scale was further divided into categories indicating the respondent's performance as follows: (a) 0-1 well below average, (b) 1-3 below average, (c) 3-6 average, (d) 6-8 above average, and (e) 8-9 well above average. Participants' category results were used to complete the matching procedure.

Settings

Recruitment efforts led to recruitment of individuals with ID from three district groups: (1) young adults with ID attending a weekend college and career readiness program on a college campus in partnership with an organization for people with ID, (2) individuals participating in adult day programming at a human services organization for people with ID, and (3) high school students with ID in a self-contained class focused on preparing students with ID for employment outcomes following high school. Of the participants who completed the entire study 9 were associated with the weekend college campus program, 26 attended the adult day program, and 7 were students in the high school class.

The university-based "college and career meet-up" is an example of a community-based activity. The program was open to any young adults who wished to attend, without a fee, but potential barriers to attendance still existed including transportation and knowledge of the program. Participants from the college and career program may or may not have been enrolled in school at the time of participation. Participants at the day program qualified for and attended the program through state funding. These participants were no longer enrolled in school and spent between one and five days weekly at the day program. As indicated by the day program administrators, the focus of the program is continually shifting towards facilitating employment outcomes for people with ID. However, they agreed the same initiatives to upholding legislation in support of inclusive employment outcomes for people with disabilities are resulting in more stringent standards of qualification for day programs. As a result, these initiatives have limited day program services for people with ID with stronger academic and work skills when they pass school age. Finally, the participants at the school site were students still within the IDEA

guidelines regarding students with disabilities (SWD) which mandates educational programming be available for all SWD to the age of 21.

Research activities took place across designated research sites, specific and central to each organization or school district. Participants engaged in pretests, posttests, and the intervention via a laptop computer with speakers, web access, and equipped to support TLE. The participants communicated with the avatars using an external microphone. The TLE one-on-one setup is depicted in Figure 6. In each setting, the computer was located in a private room with minimal outside noise. The participant and the researcher were present in the intervention room. Video and audio from all avatar interactions was recorded.

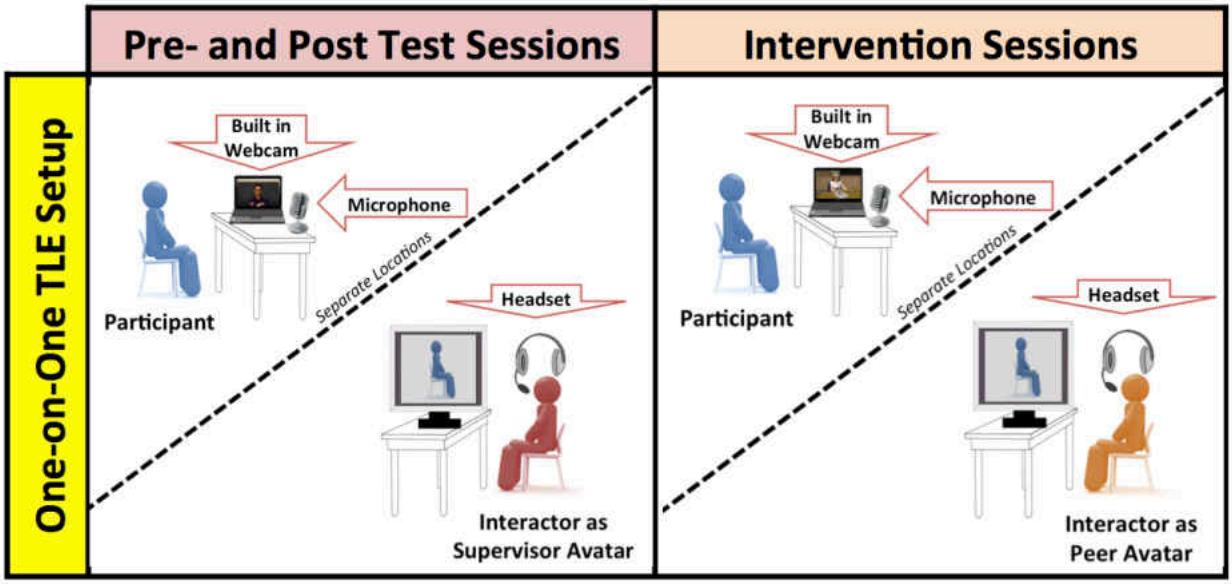


Figure 6: In-FORCE Session Setup

Research Design

The purpose of this study was to examine the effects of the In-FORCE mixed-reality role play intervention on workplace communication skills. The effects of the intervention were examined using an experimental group design with a pre-post measure (Gall et al., 2007). The

study was classified as experimental because participants were randomly assigned to either the treatment or the control group using a matching procedure (Gall et al., 2007). An equal number of participants were initially assigned to each group. Random assignment allowed for the assessment of pre-post achievement of each group as well as comparisons between the groups.

Instruments

Transition Assessment and Goal Generator

The TAGG-S was used to drive the matching process. Designed for students transitioning out of high school, the creators of the TAGG recommended it as appropriate for SWD expected to pursue competitive employment in the future (Martin et al., 2015). Some of the participants in this study were older than traditional high school SWDs engaged in transition activities, mainly those participating in the adult day program, however, those participants were beginning a newly instituted program at the facility to transition clients to competitive employment. This feature made the questions and skills within the TAGG relevant for these participants despite the age discrepancy. Three parallel assessments comprise the TAGG transition assessment suite, the student version, a family version, and a professional version. All three versions are to be considered in aggregate for the purpose of transition assessment (Martin et al., 2015). For the purpose of this study, as a matching tool, only the TAGG-S was administered.

The assessment was administered on a computer. All 34 multiple choice questions contained simple language and were offered in written, audio, and American Sign Language video form. The TAGG-S administration prompts students to rate their own performance or transition-related behaviors on a 3-point scale. Most questions are associated with choices of

responses including “rarely,” “sometimes,” or “often”. A small number of questions require a “yes” or “no” response (Martin et al., 2015). The online platform automatically generates a report based on responses to the multiple-choice items. Respondents’ answers inform numeric scores in eight transition-related constructs: (1) strengths and limitations, (2) disability awareness, (3) persistence, (4) interacting with others, (5) goal setting and attainment, (6) employment, (7) student involvement with the individualized education program (IEP), and (8) support community (Martin et al., 2015). A composite score is also reported, and was used to inform the matching procedure within this study.

Demographic Questionnaire

The *In-FORCE Participant Questionnaire* (see Appendix E) was administered to participants following completion of the consent process. Participants completed the questionnaire in a web-based platform, or on paper, and were encouraged to ask for assistance with the questions as needed. Participants were asked about current and previous employment, reasons for leaving employment, and their desire to obtain employment in the future.

The questionnaire contained eight questions. Four questions provided multiple choice checkbox selections, three questions required the respondent to select a number to answer the questions, and one question included a line for the participant to supply a response. Responses were not required for any of these questions, information was permitted to be withheld by any participant, for any reason. This withholding did not impact an individual’s eligibility to participate in the study or complete other questions on the survey as they chose.

The first question prompted the participants to indicate whether or not they were currently employed, currently working in an unpaid position, or had done either activity in the

past. The second question prompted participants to indicate how many jobs or unpaid positions they had held in their lifetime, including any current jobs, and the third question asked participants to describe the reason they stopped working at their last job, if applicable. The fourth question asked participants to state whether or not they hoped to be employed in the future. In questions 5 through 10, the respondents were asked to provide personal or household information. The respondents were asked to provide their IQ in Question 5. The researcher found that only one participant at the college campus site had this information. Due to the lack of availability, this question was skipped at the other research sites. In Question 6, respondents were asked to provide information regarding what type of diploma they received, or were to receive (i.e., regular or alternative/special education). Questions 7 and 8 were used to request participants' age and gender, respectively. In Question 9, respondents were asked to select the category that best describes their annual household income. This information was not readily available for participants at the adult day program, or school site, so the data are being omitted from the overall analysis. Question 10 was comprised of a series of four dichotomous questions designed to help the researcher gain insight into participants' experience with technology. Demographic survey responses, by group assignment, are depicted in Table 2.

Table 2: Demographic Information

	Treatment *n* (%) (*n* = 20)	Control *n* (%) (*n* = 22)	Total *n* (%) (*n* = 42)
Demographic			
Gender			
Male	9 (45)	10 (46)	19 (45)
Female	11 (55)	12 (55)	23 (55)
Age range (in years)	16 - 65	16 - 60	16 - 65
Employment and Education			
Current work status			
Paid job now	3 (15)	6 (27)	9 (21)
Unpaid/ volunteer job now	3 (15)	5 (23)	8 (19)
Paid job before, not now	9 (45)	9 (41)	18 (43)
Unpaid/ volunteer job before, not now	2 (10)	1 (5)	3 (7)
No work/ volunteer experience	3 (15)	1 (5)	4 (10)
Want a job in the future			
yes	18 (90)	20 (91)	38 (91)
no	2 (10)	2 (9)	4 (10)
Number of job/ volunteer positions in lifetime			
1	3 (15)	9 (41)	12 (29)
2	4 (20)	6 (27)	10 (24)
3	7 (35)	1 (5)	8 (19)
4	0 (0)	0 (0)	0 (0)
5	1 (5)	0 (0)	1 (2)
6 or more	2 (10)	5 (23)	7 (17)
No response	3 (15)	1 (5)	4 (10)
Reason for leaving last job			
Quit	5 (25)	5 (23)	10 (24)
Terminated	1 (5)	1 (5)	2 (5)
Time limited position or reduction in force	7 (35)	3 (14)	10 (24)
Other reason	1 (5)	0 (0)	1 (3)
No response (may indicate no previous jobs)	6 (30)	13 (59)	19 (45)
Diploma type			
Regular diploma	4 (20)	8 (36)	12 (29)
Alternate/ special/ IEP diploma	15 (75)	14 (64)	29 (69)
No response	1 (5)	0 (0)	1 (2)
Technology			
Use the internet almost daily			
yes	13 (65)	15 (68)	28 (67)
no	7 (35)	7 (32)	14 (33)
Have a cell phone that connects to the internet			
yes	9 (45)	13 (59)	22 (52)
no	11 (55)	9 (41)	20 (48)
Have a Facebook account			
yes	7 (35)	10 (46)	17 (41)
no	13 (65)	12 (55)	25 (59)
Use another form of social media			
yes	6 (30)	6 (27)	12 (29)
no	14 (70)	16 (73)	30 (71)
Average TAGG-S Composite Score	6.95	7.05	7.00

Does not include participants who were excluded. Percentages rounded to the whole percent.

The survey was administered one of two ways: (1) via Qualtrics, an electronic survey platform, or (2) using a paper copy. On-site administrators at both the adult day treatment and the school site felt the paper copy was easier to administer, but regardless of the version, the questions were identical. Participants completed the survey in the presence of a member of the research team or anywhere they chose, including at home. The survey contained simple language and was conducive to the use of a screen reader. Participants were permitted to ask anyone they chose for assistance in completing the survey if needed. Members of the research team assisted participants in completing the survey within Qualtrics, or on paper, if needed.

Problem-solving Checklist

The instrument used to examine RQ1 and RQ2 was the *In-FORCE Problem-Solving Checklist* (see Appendix F). The checklist was created based on the U.S. DOL SCANS (1991) definition of problem-solving, requiring that an employee:

> Recognizes that a problem exits (i.e., there is a discrepancy between what is and what should or could be), identifies possible reasons for the discrepancy, and devises and implements a plan of action to resolve it. Evaluates and monitors progress, and revises plan as indicated by findings (U.S. DOL, SCANS, 1991, p. 32).

The problem-solving objectives used to measure In-FORCE outcomes are directly aligned to practices in the *student development* category of the Taxonomy for Transition Programming 2.0. The objectives are also aligned to student outcomes identified in the *Life and Career Skills* and *Learning and Innovation: Critical Thinking and Problem Solving* strands of the Framework for 21st Century Learning. The alignments are illustrated in Appendix B.

After development, six experts from the fields of post-secondary transition and entry-level employment validated the problem-solving checklist. The experts were asked: "Would fulfilling each item on this checklist make you feel an entry-level employee was prepared to solve a problem?" When the checklist was used in a pilot study in spring 2015 the researcher completed the checklist for each interaction, a second trained rater completed the checklist for 33% of the interactions to determine the reliability of the ratings. Initial data analyses indicated the two raters achieved greater than 80% inter-observer reliability.

The researcher used the *In-FORCE Problem-Solving Checklist* instrument (see Appendix F) to rate each problem-solving interaction with the supervisor avatar. The rating was completed in real-time, or using video recording of each interaction. Each checklist objective was operationally defined and aligned to the Taxonomy for Transition Programming 2.0 and 21st Century Skills (see Appendix B). Six experts in the fields of entry-level employment and employment of individuals with ID validated all checklist items for applicability to typical workplace situations.

Social Validity Survey

A final instrument, the *Perception of In-FORCE Training* (see Appendix C) survey, was designed to assess participants' perceptions of the experience and social validity of the In-FORCE intervention. The survey addressed three classes of questions: (1) whether or not the virtual avatars were realistic, (2) whether or not the participant felt the experience would have a positive effect on problem-solving abilities, and (3) whether or not the participant felt the experience would have a positive effect on future employment outcomes. This survey had two versions, one for the treatment group and one for the control group. The control group version

did not include the questions about C.J., the peer avatar, as those questions did not apply to control group participants. The survey, which included graphic representations, was offered to participants in written form. Participants were permitted to ask a research associate to read the questions or clarify words if needed. Most participants elected to have the survey read to them, however the graphic depiction of the "yes" and "no" responses allowed all participants to opportunity to select their response without the response options being read. The perception survey was administered following the final posttest interaction.

Procedures

Following a training session to ensure ability to interact with a virtual avatar, all participants completed a pretest problem-solving interaction with the supervisor avatar, Ms. Adkins. Treatment group participants went on to complete four interactions with the peer virtual avatar, C.J. Both avatars are depicted in Figure 1. The C.J. avatar was selected from the five available young adult avatars to fill the role of peer, because this avatar can be accessed in remote sites using lower bandwidth, which minimized technical difficulties when traveling to research sites. The C.J. avatar has naturally occurring open body positions, which were needed for this study. The use of this avatar allowed the study to occur without any additional costs incurred in relation to making computer adaptations and system integration changes of an avatar.

During each interaction, the participant and the peer avatar discussed a different workplace problem. Participants were asked to collaborate with the peer avatar. The peer avatar was prepared to support and coach the participant by addressing the problem-solving criteria to be measured in the evaluation. A final posttest was completed by all participants in the form of another interaction with the supervisor avatar. The intervention package and participation by

each group is depicted in Figure 2. Problem-solving achievement was measured in both pretest and posttest interactions for each participant using the *In-FORCE Problem-Solving Checklist* (see Appendix F). Data were also collected following the consent process using the *In-FORCE Participant Questionnaire* (see Appendix E), during the training session to confirm eligibility using the training checklist (see Appendix O), and after the posttest using the *Perception of In-FORCE Training Survey* (see Appendix C).

Research Timeline

A comprehensive timeline for the study can be found in Appendix P. This timeframe was constructed based on experience conducting similar research for a pilot study of this intervention and updated to reflect the actual timelines of this study. Following group assignment, data collection took place over six weeks. Each participant engaged in all research activities within a period of four weeks or less, but because the researcher recruited participants from multiple settings and all groups did not engage concurrently, the overall data collection window spanned six weeks.

Problem Scenarios

Participants were presented with workplace-based problem scenarios adapted from a career skills curriculum developed by the U.S. DOL (n.d.). All scenarios were written below 4.5 Flesch-Kincaid Grade Level. Problem scenarios were available in video, audio, and text format. Closed captioning was enabled in video format based on feedback from a preference assessment administered to a group of four young adults with ID not participating in the In-FORCE intervention. Of the 20 scenarios, 50% were validated by a group of six experts in the fields of transition and entry-level employment. Following creation of the video versions, 33% were

validated for accurate portrayal of the text version by two of the experts. The experts were asked to watch each randomly selected video, compare it to the corresponding text copy, and respond to the question: Does this video accurately portray the text? Text copies of the problem scenarios and links to the videos used in the study can be found in Appendix Q.

Interactor Training

Two TLE interactors were trained and available to interact as both the peer and the supervisor for this study. Dialogue guides were created to facilitate the opportunity for participants to address each problem-solving objective in each interaction and to control interaction content, similarity, and length. The pretest/posttest and intervention dialogue guides, included in Appendices A and D respectively, provided direction for the interactor around each question to be asked during the intervention and were aligned with the problem-solving checklist (see Appendix F). The dialogue guides specified when it was appropriate for the supervisor avatar, Ms. Adkins, to give prompts. The peer avatar, C.J., prompted the participants any time they missed a response. The dialogue guides also specified the clarifying and critical questions to accompany each scenario. Interactor training included sharing session objectives, general research protocols, and specific prompts to be included in each interaction. One-third of all sessions were evaluated for fidelity of implementation of both the interactions and the researcher's adherence to the training protocol using fidelity checklists that were specific to the type of session.

Participant Training Session

Participants completed a training session prior to the implementation of the In-FORCE intervention as indicated in Figure 2. This session included two segments of pre-recorded video

and participant meet-and-greet interactions with a virtual avatar. This measure was put in place to ensure participants' ability to interact with a virtual avatar. The researcher script for the training session can be found in Appendix R.

Video, Part 1

Part 1 of the video included: (1) a description of the concept of role play, (2) an introduction to the concept of a virtual avatar, and (3) a review of the protocol directing the participant to review the problem scenario before future interactions.

Meet-and-Greet

After viewing Part 1, participants 'met' a TLE avatar. All participants completed the meet-and-greet session with the Ms. Adkins avatar. This avatar was then used to interact with each participant in the role of supervisor. To progress past the training phase, participants were required to demonstrate the ability to: (1) make eye contact with the avatar; (2) visually attend to the avatar's speech and actions; (3) respond to a question posed by the avatar; and (4) ask a question of, or initiate discussion with the avatar. The research team used the training checklist to assess participant achievement of these indicators with the training avatar (see Appendix O). All training interactions followed a dialogue guide to ensure consistency and opportunity for participants to meet each training objective (see Appendix S). The 5-minute training interactions could have been conducted up to three times per participant. In cases where participants did not meet all objectives, the avatar provided coaching and subsequent attempts as needed. In cases where a participant did not achieve all four criteria for mixed-reality interactions with an avatar, despite coaching, he or she was excluded from the study. This was the case with three participants.

Video, Part 2

Part 2 of the training video followed the meet-and-greet; participants previewed a sample problem scenario. The same sample scenario was used with all participants, and the sample scenario was selected from those not used in the pretest, posttest, or intervention sessions. Participants were told the problem-solving sessions would include a different problem scenario video and a meeting with a virtual avatar to discuss the problems. Participants were told they would discuss a new problem at each meeting.

Pretest Interaction

Each pretest interaction began with the presentation of a problem scenario. Participants watched Scenario 5 on an iPad with closed captioning enabled. Participants then had a chance to ask questions of the researcher to clarify the scenario. Of the six successfully validated scenarios, one was randomly selected for use in all pretest interactions for all participants. After watching the video, participants engaged in a 5-minute conversation with the supervisor avatar. In the role of a supervisor, the avatar asked participants to discuss a solution to the problem. As indicated in the dialogue guide found in Appendix A, the supervisor avatar only prompted participants with the correct response for the first two verbal problem-solving objectives: (1) What was the problem? And (2) Why was it a problem? This procedure was executed, because not providing this specific information to participants might prohibit them from achieving the subsequent verbal problem-solving objectives. The supervisor avatar only prompted participants for nonverbal problem-solving behaviors in the pretest if they did not achieve these skills.

All participants in both the control and the treatment groups completed the pretest interaction during the same timeframe. Problem-solving objective achievement was assessed

using the *In-FORCE Problem-Solving Objective Checklist* (see Appendix F) derived from guidelines from the U.S. DOL (1991). All pretest interactions followed the dialogue guide included in Appendix A to ensure consistency and opportunity for each participant to meet each objective.

Peer Intervention Interactions

Following the pretest interaction, participants assigned to the treatment group completed a series of four, 5-minute interactions with the peer avatar, for 20 minutes of total interaction with the peer avatar. In the order administered, the problem scenarios driving the intervention sessions were: Scenarios 7, 6, 19, and 16. Participants were told that sessions with the peer avatar would follow the same procedures of scenario viewing as the pretest, but the peer avatar would be available to help them think about the problem and work out a solution.

A new problem scenario preceded each interaction. The peer avatar was prepared to support participants by addressing the problem-solving criteria to be measured in the evaluation. All peer avatar interactions followed the dialogue guide included in Appendix D to ensure consistency and opportunity for each participant to practice each objective. As indicated in the dialogue guide included in Appendix D during intervention sessions the peer avatar prompted the participant with the correct response to any verbal problem-solving objective that was missing or incorrect. The peer avatar also provided coaching or feedback for each verbal problem-solving objective, in the form of affirmation for a correct response, or explanation of a prompted response. The peer avatar only addressed nonverbal problem-solving behaviors if a participant did not achieve them.

Posttest Interaction

A second interaction with the supervisor avatar served as a posttest for all participants from both groups. All participants completed the posttest during the same timeframe. Participants reviewed a final problem scenario, Scenario 3, and met with the supervisor avatar for five minutes to solve the problem scenario. The researcher used the *In-FORCE Problem-Solving Objectives Checklist* (see Appendix F) to determine the number of objectives achieved. All posttest interactions followed the dialogue guide included in Appendix A to ensure consistency and opportunity for each participant to practice each objective. As indicated in the dialogue guide found in Appendix A in the posttest, the supervisor avatar only prompted participants with the correct response for the first two verbal problem-solving objectives: (1) What was the problem? And (2) Why was it a problem? This procedure was executed, because the researcher felt not providing this specific information to participants might prohibit them from achieving the subsequent verbal problem-solving objectives. The supervisor avatar only prompted participants for nonverbal problem-solving behaviors in the posttest if they did not achieve these skills.

Research Fidelity

Explicit implementation protocols were developed for all research activities allowing the researcher, data collectors, and TLE interactors to implement the intervention with fidelity. To introduce each research session to each participant the research team members followed established scripts, included in Appendix T. The researcher used a fidelity checklist to evaluate 33% of the interactions between the participants and the avatars. The fidelity checklist for training interactions can be found in Appendix U. The checklist to measure fidelity of pretest,

posttest, and intervention interactions can be found in Appendix V. The fidelity checklist for pretest, posttest, and intervention interactions included a line for each element of the interaction. Raters were directed to mark "1" if the element took place, "0" if it did not, or "N/A" or mark a slash if the element did not apply to the interaction. Examples of elements that would not apply include prompting for a nonverbal objective if the participant achieved the objective, or implementing peer coaching feedback if the session was a pretest or posttest interaction with the supervisor avatar. Percentage of fidelity was then calculated by dividing the total number of "1" ratings by the total number of applicable ratings (i.e., "1"s and "0"s) for each interaction. Minimum acceptability for interaction fidelity was set at 90% a priori, and the researcher reviewed protocols following any sessions not meeting acceptable fidelity. An observer also evaluated training sessions at each research site (including training video content and avatar interactions) to ensure they were conducted to fidelity using the checklist in Appendix W. The researcher identified several additional threats to research validity before the study was carried out and addressed each, as described in Table 3.

Table 3: Potential Threats to Validity and Safeguards

Threats	Safeguards
Unrealistic problem scenarios	Scenarios were adapted from situations already presented in the U.S. Department of Labor's *Skills to Pay the Bills* (n.d.) soft skills curriculum. A panel of six experts validated scenarios for applicability and equivalence.
Inconsistent interaction with the avatars	Two TLE interactors were trained by the researcher to control both avatars. Interactors followed specific session guidelines to ensure consistency.
Previous experience in the TLE virtual classroom	It is possible more TLE exposure than provided within the study may have a dosage effect, threatening validity. Before selection, potential participants were asked if they have ever participated in research in the TLE virtual classroom. Any potential participants with prior experience beyond a "meet and greet" or demonstration session were excluded from the study.
Observer Bias	It is possible that during pre- and posttesting observers may have allowed their observations to be influenced by the knowledge of whether or not a participant is in the treatment group (Gall et al., 2007). To control for this, pre- and posttest sessions were identical for members of the treatment and control groups, and members of both groups completed these sessions within the same time period.
Hawthorne Effect	It is possible that the novelty of participating in a research study may contribute to inflated results during problem-solving sessions (Gall et al., 2007). To offset possible inflation, the researcher compared results of participants in the treatment group to participants in the control group who did not receive the intervention.
Use of a Convenience Sample	Use of a convenience sample can diminish generalizability of the effects of the intervention on the sample to the general population of young adults with ID (Gall et al., 2007). Obtaining an appropriate random sample for a true experimental design is prohibitive for this intervention, but the researcher mitigated this to the extent possible by creating matched pairs of participants using participants' composite scores on the TAGG-S and randomly assigning one member of each matched pair to either the treatment or the control group.

Data Collection

Data for the research questions were collected through multiple means. An overview of data collection procedures and elements are provided in Table 4. Demographic information was collected from each participant following the consent process. Items collected included age, gender, and disability classification. Participants were asked to answer questions about current

and past employment as well as intention of future employment. The questionnaire was administered in electronic or written form, if requested it was also administered verbally, based on participant preference. The *In-FORCE Problem-Solving Checklist* was used to assess participant achievement in the pretest and posttest sessions. Finally, the *Perception of In-FORCE Training* (see Appendix C) social validity survey was administered to participants in written or verbal form at the end of research activities.

Table 4: Data Collection Objectives, Timelines, and Tools

	Demographic Information	**Disability Status**	**Employment Status/ History**	**Problem-Solving Objectives (10)**	**Social Validity Post-Survey**
Information Collected	• Age • Gender • IQ (self-reported) • Diploma type	• Disability classification	• Current employment or volunteer status • Number of previous jobs • Reasons for leaving • Intent to gain employment	<u>*Verbal*</u> • Restate the problem • Describe why it is a problem • Describe a solution • Answer questions from supervisor (2) <u>*Nonverbal*</u> • Voice control • Pause to listen • Make eye contact (2) • Use appropriate body language	• Impressions of TeachLivE™ interactions (control group participants only rated interactions with the supervisor avatar). • Perceived benefits to problem-solving • Perceived benefits to employability
Timeline for Collection	Upon completion of consent process			During In-FORCE Intervention Sessions	Following the final intervention session
Means of Collection	Electronic or verbal questionnaire *(see Appendix E)*			Checklist *(see Appendix F)*	Electronic or verbal survey *(see Appendix C)*

<u>Data Management</u>

All participant meet-and-greet, pretest, intervention, and posttest interactions were video recorded by the researcher while observing the sessions at the research site. A smart phone with video capabilities and a tripod were used to record all sessions. These recordings were used for fidelity, reliability, data collection, and data analysis as needed to supplement real-time

observation. To streamline the organization and management of these recordings, at the beginning of each interaction, the participant was asked to hold a card, in view of the camera. The card included the participant code and the type of interaction about to take place. Cards were also color-coded by type of interaction. When the recording began, the card was collected by the researcher and properly disposed of to avoid confusion and distraction. Participants were told the cards helped the research team organize the recordings. This step also assisted the TLE interactor in confirming the participant (for personalization of the interaction) and the dialogue guide to be followed. All recordings were saved on a high-capacity flash drives and stored in a locked cabinet in a locked room for the amount of time approved by the IRB.

Inter-observer Agreement

Participant achievement of verbal and nonverbal problem-solving behaviors was rated by the researcher using the *In-FORCE Problem-Solving Checklist* (see Appendix F) during each pretest and posttest supervisor virtual avatar interaction. To determine reliability of checklist ratings, a trained research associate independently evaluated 33% of the interactions. The completed checklists from both raters were compared for agreement. Agreement was recorded based on the percent of objectives for which both observers were in agreement. Due to the observational nature of this data collection, the minimum agreement threshold was set at 80%. Agreement was calculated using the formula: (total number of items – number of disagreement) / total number of items (Gast, 2010). Agreement was determined for each selected interaction, and the results were averaged to determine reliability across the study.

Data Analysis Plan

Research Questions 1 and 2

The researcher rated each objective in the *In-FORCE Problem-Solving Checklist* (see Appendix F) each time a participant completed a pretest or posttest interaction. Each objective was awarded a point value of 0 or 1 based on non-achievement or independent achievement, respectively. Achievement with a prompt, as defined by the researcher in Appendix X, was considered non-achievement and rated as 0.

The checklist contained five verbal and five nonverbal criteria, verbal and nonverbal achievements were recorded separately, and a total achievement score was recorded. Each subset (i.e., verbal, nonverbal, total score) was compared pre-to-post and comparisons were made between treatment and control group scores using a repeated measures ANOVA with one factor between groups with an alpha level of 0.05. Overall checklist scores also were compared using a repeated measures ANOVA with one factor between. Each objective on the checklist was compared pretest to posttest using the McNemar test for correlated proportions. All analyses were conducted using IBM SPSS Statistics 21 software. The repeated measures ANOVA with one factor in between was the best statistical analysis for these data, because it provided an assessment of pretest to posttest change as well as the interaction between the intervention, or absence of the intervention and participant assignment to the treatment or control group (Stevens, 2007). The McNemar test for correlated proportions is an appropriate analysis for examining dichotomous variables from pretest to posttest, as measured in this study (Adedokun & Burgess, 2012). Using the matching procedure to increase equivalence between treatment and control groups strengthened the analysis.

Excluded Data

Several conditions were identified before the start of the study that would lead to exclusion of a participant's data from analyses in the study. The researcher identified the following criteria, that when met, resulted in the exclusion of the individual participant's data:

1. A participant displayed anxiety or frustration about or during the interactions with the virtual avatars.
2. A participant did not meet the inclusionary requirements set forth by the researcher in the participant description.
3. A participant did not successfully meet the training requirements, indicating he or she could not successfully communicate with the virtual avatar(s).
4. A participant did not complete both the pretest and the posttest virtual avatar interaction.
5. A participant in the treatment group did not complete all four of the intervention sessions.

CHAPTER FOUR: RESULTS

Overview of Data Analysis

The purpose of this study was to examine the effects of mixed-reality peer interactions in a simulated mixed-reality environment on the workplace problem-solving communication of individuals with intellectual disabilities (ID). Results of the analyses for each research question are presented in this chapter:

RQ1: To what extent do In-FORCE problem-solving intervention sessions increase the abilities of young adults with ID to implement verbal workplace problem-solving skills, as measured by the rate of independently achieved objectives in a problem-solving checklist based on standards from the U.S. Department of Labor (DOL) Secretary's Commission on Achieving Necessary Skills (SCANS; 1991)?

- Independent variable: In-FORCE problem-solving intervention sessions
- Dependent variable: Rate of independent achievement of verbal workplace problem-solving objectives during problem-solving sessions with a virtual supervisor
- Hypothesis: Participation in In-FORCE problem-solving intervention sessions will increase independent participant achievement of verbal problem-solving objectives with a virtual supervisor

RQ2: To what extent do In-FORCE problem-solving intervention sessions increase the abilities of young adults with ID to implement nonverbal workplace problem-solving skills, as measured by the rate of independently achieved objectives in a problem-solving checklist based on standards from the U.S. DOL SCANS (1991)?

- Independent variable: In-FORCE problem-solving intervention sessions
- Dependent variable: Rate of independent achievement of nonverbal workplace problem-solving objectives during problem-solving sessions with a virtual supervisor
- Hypothesis: Participation in In-FORCE problem-solving intervention sessions will increase independent participant achievement of nonverbal problem-solving objectives with a virtual supervisor

Research question one was posed to examine changes in participant achievement of verbal problem-solving skills as measured by the *In-FORCE Problem-Solving Checklist* (see Appendix F). Changes from pretest to the posttest were compared between the treatment and control groups based on participation in 20 total minutes of peer virtual avatar intervention interaction by members of the treatment group. Because there were only two levels of repeated measures in this analysis the traditional test of sphericity conducted with a repeated measures ANOVA with one factor between did not yield results usable to confirm assumption of homogeneity. The researcher instead performed Levene's Test for Equality of Variances to confirm homogeneity of variances between treatment and control groups for each dependent variable. The researcher performed a repeated measures ANOVA with one factor between groups and an alpha level of .05 for the verbal score subset. In the verbal subset of the *In-FORCE Problem-Solving Checklist*, participants were able to achieve between zero and five points, based on the number of objectives achieved from the subset.

Similarly, research question two enabled the researcher to examine changes in participant achievement of nonverbal problem-solving skills as measured by the *In-FORCE Problem-Solving Checklist* (see Appendix F). Again, a repeated measures ANOVA with one factor between and an alpha level of .05 was performed to compare changes in nonverbal problem-solving objectives from pretest to posttest between the treatment and control groups. As with the verbal subset, participants were able to achieve between zero and five points in the nonverbal subset, based on the number of objectives achieved.

For additional consideration, the researcher also performed the McNemar test of correlated proportions to compare pretest to posttest changes for the treatment and control groups on each objective in both subsets. These analyses were performed on a total of 10 objectives.

Instrumentation

The *In-FORCE Problem-Solving Checklist* (see Appendix F) was used to measure problem-solving achievement of the participants in the experimental and control groups at pretest and posttest. The problem-solving checklist, based on the U.S. DOL SCANS (1991) was comprised of 10 objectives, five related to verbal communication and five related to nonverbal communication. The objectives are further explained in Appendix B. For each pretest and posttest interaction, the researcher completed the *In-FORCE Problem-Solving Checklist* (see Appendix F) in real time, while observing the participant engage in the interaction. Achievement of each objective was measured by the selection of a "yes" checkbox or "no" checkbox. Each "yes" selection was rated as one point, each "no" selection rated at zero points. The problem-solving checklist was tallied by subset (i.e., verbal and nonverbal) for a total of five possible points per subset, and as a whole for a total of 10 possible points on the checklist.

Data Analysis Procedures

Data were entered into a data file within IBM SPSS Statistics 21 software. All participants who completed the consent process were included in the data file. A variable was included to indicate if the participant (a) was part of the treatment group, (b) was part of the control group, (c) did not begin the study, (d) was determined to be ineligible to participate, or (e) did not complete the study. The number of participants in each category is depicted in Table 5. Data were analyzed for members of the treatment and control groups only, with participation in the treatment (i.e., peer interactions in the Innovative Facilitation of Requisite Communication Skills for Employment, In-FORCE, intervention) identified as the independent variable. Twenty participants were in the treatment group and 22 participants were in the control group. The sample size of $n = 42$ total exceeded the target sample size of 34 indicated in the results of an a priori power analysis conducted using G*Power 3.1. All statistical analyses were completed using IBM SPSS Statistics 21 software.

Table 5: Group Assignment Totals

Group	Treatment	Control	Did not begin	Ineligible	Did not complete
n	20	22	6	3	2

Overall Pretest to Posttest Analyses

Research Question 1

The researcher posed research question 1 (RQ1) to examine the changes in achievement of verbal problem-solving objectives from pretest to posttest based on group assignment. To analyze these data, the researcher performed a repeated measures ANOVA with one factor between. The alpha level for this analysis was set at .05. Verbal pretest and verbal posttest scores

were designated as the two measures for this analysis, the between factor was group assignment, with only the treatment and control groups included. For both pretest and posttest, participants could achieve between zero and five points. The sample met the assumption of homogeneity based on the non-significant ($p > .05$) results of Levene's Test for Equality of Variances for pretest and posttest variables. No statistically significant difference ($p > .05$) was found between verbal pretest and verbal posttest scores based on group assignment with a low effect size of .055 for verbal score differences based on group assignment. Further examination of the results revealed that the verbal posttest mean for the treatment group ($M = 3.45$) was higher than the verbal pretest mean for the same group ($M = 3.15$) after four 5-minute peer avatar interactions. The verbal posttest mean for the control group ($M = 2.28$) was lower than the verbal pretest mean for the control group ($M = 3.00$). The results of the RQ1 analyses are presented in Table 6.

Table 6: Research Question 1 Analyses

	df	Mean Square	F	*p*	Partial Eta Squared
Verbal * Group	1	1.216	2.346	.134	.055

Research Question 2

The researcher posed research question 2 (RQ2) to examine the changes in achievement of nonverbal problem-solving objectives from pretest to posttest based on group assignment. To analyze these data, the researcher performed a repeated measures ANOVA with one factor between. The alpha level for this analysis was set at .05. Nonverbal pretest and nonverbal posttest scores were designated as the two measures for this analysis; the between factor was group assignment, with only the treatment and control groups included. For both pretest and posttest, participants could achieve between zero and five points. The sample met the assumption

of homogeneity based on the non-significant ($p > .05$) results of Levene's Test for Equality of Variances for both pretest and posttest variables. No statistically significant difference ($p > .05$) was found between nonverbal pretest and nonverbal posttest scores based on group assignment with a very low effect size of .006 for differences in nonverbal problem-solving score based on group assignment. Further examination of the results revealed that the nonverbal posttest mean for the treatment group ($M = 4.85$) after four 5-minute peer avatar interactions was higher than the nonverbal pretest mean for the same group ($M = 4.75$). The nonverbal posttest mean for the control group ($M = 4.73$) also was higher than the nonverbal pretest mean for the control group ($M = 4.55$). The results of the RQ2 analyses are presented in Table 7.

Table 7: Research Question 2 Analyses

	df	Mean Square	F	*p*	Partial Eta Squared
Nonverbal * Group	1	.035	.253	.617	.006

Analysis of Overall Problem-solving Scores

To further examine the research outcomes, the researcher conducted an analysis to examine the changes in achievement of all problem-solving objectives on the *In-FORCE Problem-Solving Checklist* from pretest to posttest based on group assignment. To analyze these data, the researcher performed a repeated measures ANOVA with one factor between. The alpha level for this analysis was set at .05. Total pretest and total posttest scores were designated as the two measures for this analysis; the between factor was group assignment, with only the treatment and control groups included. For both pretest and posttest, participants could achieve between zero and ten points. The sample did not meet the assumption of homogeneity based on the significant ($p < .05$) results of Levene's Test for Equality of Variances for pretest and posttest

variable, to adjust for this the results were reported with the Greenhouse-Geisser correction applied. No statistically significant difference ($p > .05$) was found between pretest and posttest scores based on group assignment with a low effect size of .033 for total problem-solving score based on group assignment. Further examination of the results revealed that the posttest mean for the treatment group ($M = 8.30$) was higher than the pretest mean for the same group ($M = 7.90$). The mean total score for the control group was the same for both the pretest and the posttest ($M = 7.55$). The results of the overall analyses are presented in Table 8.

Table 8: Total Problem-solving Score Analyses

Total * Group	df	Mean Square	F	*p*	Partial Eta Squared
	1.000	.838	.1.374	.248	.033

Analyses by Individual Problem-solving Objective

The researcher examined pretest to posttest change for each objective on the *In-FORCE Problem-Solving Checklist* for the treatment and control groups. The researcher applied the McNemar test, a non-parametric analysis derived from Chi-square for use with dichotomous pretest to posttest measures. Treatment group results for the McNemar test are depicted in Table 9 and control group results for the McNemar test are depicted in Table 10. Treatment group and control group results were analyzed separately, however, no significance ($p > .05$) was found for any objective in either group.

Table 9: McNemar Test Results by Problem-solving Objective, Treatment Group

Pretest and Posttest Objective	What was the problem?	Why was it a problem?	Describe a solution	Answer a clarifying question	Answer a critical question	Voice control	Pause to listen	Make eye contact when listening	Make eye contact when speaking	Use appropriate body language
n	20	20	20	20	20	20	20	20	20	20
p	1.000	.125	.688	.625	.688	-	1.000	.500	1.000	1.000

Table 10: McNemar Test Results by Problem-solving Objective, Control Group

Pretest and Posttest Objective	What was the problem?	Why was it a problem?	Describe a solution.	Answer a clarifying question.	Answer a critical question.	Voice control.	Pause to listen.	Make eye contact when listening.	Make eye contact when speaking.	Use appropriate body language.
n	22	22	22	22	22	22	22	22	22	22
p	1.000	.219	1.000	1.000	1.000	1.000	.500	.500	1.000	1.000

The researcher analyzed results for each objective, as observed in pretest and posttest sessions, for each participant in the study. Results for each objective are provided for each participant along with age and gender, into tables to provide a visual depiction of data trends. Separate tables are provided for the treatment group (see Table 11) and control group (see Table 12). The researcher discusses trends in the data for each of the tasks performed by the participants in the simulator based upon Tables 11 and 12.

Table 11: Treatment Group Individual Results by Objective

Participant Code	TAGG-S	Age	Gender		Objective 1	2	3	4	5	6	7	8	9	10
T1	6	19	Male	Pre	yes	no	yes	yes	no	yes	yes	yes	yes	yes
				Post	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
T2	9	20	Male	Pre	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
				Post	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
T3	3	*	Female	Pre	no	no	yes	yes	yes	yes	yes	yes	yes	yes
				Post	yes	no	yes	yes	yes	yes	yes	yes	yes	no
T4	6	64	Male	Pre	yes	yes	yes	no	yes	yes	yes	yes	yes	yes
				Post	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
T5	7	34	Female	Pre	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
				Post	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
T6	6	65	Male	Pre	yes	yes	yes	yes	yes	yes	yes	no	no	yes
				Post	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
T7	9	52	Female	Pre	yes	no	yes	yes	yes	yes	yes	no	yes	yes
				Post	yes	no	yes	yes	no	yes	yes	yes	yes	yes
T8	8	*	Male	Pre	no	no	yes	no	yes	yes	yes	yes	yes	yes
				Post	no	no	no	yes	yes	yes	yes	yes	yes	yes
T9	8	54	Female	Pre	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
				Post	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
T10	9	35	Male	Pre	no	no	yes	no	yes	yes	yes	yes	yes	yes
				Post	yes	yes	no	yes	yes	yes	yes	yes	yes	yes
T11	5	49	Female	Pre	no	no	yes	yes	yes	yes	yes	yes	yes	yes
				Post	no	no	no	yes	yes	yes	yes	yes	yes	yes
T12	8	55	Male	Pre	no	no	yes	yes	no	yes	yes	yes	yes	yes
				Post	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
T13	5	28	Female	Pre	yes	no	no	yes	yes	yes	yes	yes	yes	yes
				Post	no	yes	yes	yes	yes	yes	yes	yes	yes	yes
T14	7	61	Male	Pre	yes	no	yes	yes	no	yes	yes	yes	yes	yes
				Post	no	no	yes	no	yes	yes	yes	yes	yes	yes
T15	7	26	Male	Pre	no	no	yes	no	no	yes	no	yes	yes	yes
				Post	no	no	no	no	no	yes	no	yes	yes	yes
T16	9	45	Female	Pre	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
				Post	no	yes	yes	yes	yes	yes	yes	yes	yes	yes
T17	6	16	Female	Pre	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
				Post	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
T18	7	16	Female	Pre	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
				Post	no	no	yes	yes	yes	yes	yes	yes	yes	yes
T19	9	19	Female	Pre	yes	no	yes	yes	yes	yes	yes	yes	yes	no
				Post	no	no	yes	yes	yes	yes	yes	yes	yes	yes
T20	5	19	Female	Pre	no	no	no	yes	yes	yes	yes	yes	yes	yes
				Post	no	no	yes	yes	no	yes	yes	yes	yes	yes

* No response

Table 12: Control Group Individual Results by Objective

Participant Code	TAGG-S	Age	Gender		Objective 1	2	3	4	5	6	7	8	9	10
C1	8	28	Female	Pre	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
				Post	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
C2	6	20	Female	Pre	no	no	no	no	yes	yes	yes	no	no	no
				Post	no	no	no	no	yes	yes	yes	yes	no	yes
C3	4	25	Male	Pre	no	no	no	no	no	yes	yes	yes	yes	yes
				Post	no	no	no	yes	no	yes	yes	yes	yes	yes
C4	6	26	Male	Pre	yes	yes	yes	yes	no	yes	yes	yes	yes	yes
				Post	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
C5	7	21	Female	Pre	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
				Post	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
C6	4	19	Female	Pre	no	no	no	no	no	yes	yes	no	no	no
				Post	no	no	no	no	no	no	yes	yes	no	no
C7	9	20	Female	Pre	yes	no	no	yes	no	yes	yes	yes	yes	yes
				Post	no	no	no	no	no	yes	yes	yes	yes	yes
C8	9	60	Male	Pre	no	no	yes	yes	yes	yes	no	yes	yes	yes
				Post	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
C9	5	51	Male	Pre	yes	no	yes	yes	no	yes	yes	yes	yes	yes
				Post	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
C10	8	24	Female	Pre	no	no	yes	no	yes	yes	yes	yes	yes	yes
				Post	no	no	yes	no	no	yes	yes	yes	yes	yes
C11	8	26	Female	Pre	yes	yes	yes	yes	no	yes	yes	yes	yes	yes
				Post	yes	yes	yes	yes	no	yes	yes	yes	yes	yes
C12	9	32	Female	Pre	no	yes	yes	yes	yes	yes	yes	yes	yes	yes
				Post	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
C13	9	50	Male	Pre	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
				Post	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
C14	7	38	Male	Pre	yes	no	no	yes	no	yes	yes	yes	yes	yes
				Post	no	no	no	no	no	yes	yes	yes	yes	yes
C15	5	56	Female	Pre	no	no	no	yes	yes	no	no	yes	yes	yes
				Post	no	no	yes	yes	no	yes	yes	yes	no	no
C16	9	43	Female	Pre	no	yes	yes	yes	yes	yes	yes	yes	yes	yes
				Post	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
C17	8	43	Female	Pre	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
				Post	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
C18	9	45	Male	Pre	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
				Post	no	yes	yes	yes	yes	yes	yes	yes	yes	yes
C19	9	25	Male	Pre	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
				Post	no	no	no	yes	yes	yes	yes	yes	yes	yes
C20	6	16	Male	Pre	no	no	yes	no	no	yes	yes	yes	yes	yes
				Post	no	no	no	yes	yes	yes	yes	yes	yes	yes
C21	4	18	Male	Pre	yes	yes	yes	yes	no	yes	yes	yes	yes	yes
				Post	yes	no	yes	yes	no	yes	yes	yes	yes	yes
C22	6	18	Female	Pre	yes	yes	no	yes	yes	yes	yes	yes	yes	yes
				Post	yes	no	yes	yes	yes	yes	yes	yes	yes	yes

Verbal Problem-solving Objectives

Restate the Problem

Each session started with the supervisor avatar asking the participant to restate the problem scenario, as described in the video. From the treatment group, 12 out of 20 participants achieved this objective in the pretest; 8 did not. Of the members of the treatment group who did not achieve the restating objective in the pretest, 4 participants did achieve it in the posttest. In the control group, 13 out of 22 participants correctly restated the problem in the pretest; 9 participants did not. Of the nine participants who did not correctly restate the problem in the pretest, three achieved this objective in the posttest. For both participant groups, in both pretest and posttest interactions, the avatar supplied the correct statement of the problem for the participant if the objective was not achieved. The researcher included this initial step in the research study in dialogue with the avatar based on the performance of this initial behavior being critical to allowing an equitable opportunity to achieve subsequent objectives.

Explain why it is a Problem

Next, participants were asked by the supervisor avatar to explain why the problem scenario created a problem in the workplace. Anecdotally, the researcher noted several participants misinterpreted this request, instead explaining why they, as employees in the role play scenario, behaved the way they did. From the treatment group, 2 out of 20 participants achieved this objective in the pretest; 18 did not. Of members of the treatment group who did not successfully explain why the situation posed a problem in the pretest, one participant did achieve this objective in the posttest. In the control group, 8 out of 22 participants correctly explained the basis of the problem in the pretest, 14 participants did not. Of the 14 participants who did not

correctly explain why the scenario was a problem in the pretest, one participant achieved this objective in the posttest. For both participant groups, in pretest and posttest interactions the avatar supplied the correct reason for the problem for the participant if the objective was not achieved. The researcher included this as part of the dialogue based on the premise that this piece of information was key to allowing an equitable opportunity to achieve subsequent objectives.

Describe a Solution

Participants were asked to describe a solution to the workplace problem. This information was solicited by the supervisor avatar through the request, "What would you do differently next time?" From the treatment group, 18 out of 20 participants achieved this objective in the pretest; two did not. Of the members of the treatment group who did not offer a reasonable solution to the problem in the pretest, both participants did achieve it in the posttest. In the control group, 15 out of 22 participants offered a reasonable solution to the problem in the pretest; seven participants did not. Of the seven participants who did not have a reasonable solution to offer in the pretest, two achieved this objective in the posttest.

Answer a Clarifying Question

Participants were asked a clarifying question by the supervisor avatar. For both pretest and posttest these questions were scripted to ensure consistency. From the treatment group, 16 out of 20 participants achieved this objective in the pretest; four did not. Of the members of the treatment group who did not offer a reasonable response to the clarifying question in the pretest, three participants did achieve it in the posttest. In the control group, 17 out of 22 participants offered a reasonable response to the clarifying question in the pretest; five participants did not.

Of the five participants who did not have a reasonable solution to offer in the pretest, two achieved this objective in the posttest.

Answer a Critical Question

Participants were asked a critical question by the supervisor avatar. For both pretest and posttest these questions were scripted to ensure consistency. From the treatment group, 15 out of 20 participants achieved this objective in the pretest; 5 did not. Of the members of the treatment group who did not offer a reasonable response to the critical question in the pretest, four participants did achieve it in the posttest. In the control group, 13 out of 22 participants offered a reasonable response to the clarifying question in the pretest; nine participants did not. Of the nine participants who did not have a reasonable solution to offer in the pretest, three achieved this objective in the posttest.

Nonverbal Problem-solving Objectives

Voice Control

Participants were expected to maintain voice control during interactions with the supervisor avatar. This encompassed neither raising the voice in a way of yelling at the avatar, nor dropping the voice to an unintelligible level. From the treatment group, all participants achieved this objective in the pretest and the posttest. In the control group, 21 out of 22 participants maintained voice control in the pretest; one participant did not. The participant who did not maintain voice control in the pretest did achieve this objective in the posttest. The voice control objective was only addressed by the supervisor avatar if the participant did not maintain voice control throughout the session. The researcher took the responsibility of determining cases

in which a voice control concern was a direct result of the participant's disability; in such cases participants were not rated negatively for the voice control objective.

Pause to Listen

Participants were expected to pause and listen when the supervisor avatar spoke. This behavior included not talking over the supervisor avatar. From the treatment group, 19 out of 20 participants achieved this objective in the pretest; one did not. The member of the treatment group who did not pause to listen while the avatar spoke in the pretest did achieve this objective in the posttest. In the control group, 20 out of 22 participants paused to listen while the avatar spoke in the pretest; two participants did not. Both participants who did not pause to listen in the pretest did achieve this objective in the posttest. The pause to listen objective was only addressed by the supervisor avatar if the participant did not continue to pause to listen while she spoke throughout the session.

Eye Contact when Listening

Participants were expected to make regular eye contact when listening during interactions with the supervisor avatar. For the purpose of this study, participants were expected to orient their eyes towards the avatar's eyes at least one time during each exchange spoken by the avatar. From the treatment group, 18 out of 20 participants achieved this objective in the pretest; two did not. Both members of the treatment group who did not maintain eye contact while listening in the pretest did maintain it in the posttest. In the control group, 20 out of 22 participants maintained eye contact while listening in the pretest; two participants did not. Of the participants who did not maintain eye contact while listening in the pretest, both achieved this objective in the posttest. The eye contact while listening objective was only addressed by the supervisor

avatar if the participant did not maintain a regular pattern of eye contact while listening throughout the session.

Eye Contact when Speaking

Participants were expected to make regular eye contact when speaking during interactions with supervisor avatar. For the purpose of this study, participants were expected to orient their eyes towards the avatar's eyes at least one time during each spoken exchange. From the treatment group, 19 out of 20 participants achieved this objective in the pretest; one did not. The member of the treatment group who did not maintain eye contact while speaking in the pretest did maintain it in the posttest. In the control group, 20 out of 22 participants maintained eye contact while speaking in the pretest; two participants did not. Of the participants who did not maintain eye contact while speaking in the pretest, neither achieved this objective in the posttest. The eye contact while speaking objective was only addressed by the supervisor avatar if the participant did not maintain a regular pattern of eye contact while speaking throughout the session.

Use Appropriate Body Language

Participants were expected to maintain appropriate body language during interactions with supervisor avatar. For the purpose of this study, participants were expected to orient their body towards the avatar on the screen, refrain from crossing their arms in front of their bodies, and refrain from blocking their eyes and mouths during interactions. From the treatment group, 19 out of 20 participants achieved this objective in the pretest; one did not. The member of the treatment group who did not maintain appropriate body language in the pretest did maintain it in the posttest. In the control group, 20 out of 22 participants maintained appropriate body language

in the pretest; two participants did not. Of the participants who did not maintain appropriate body language in the pretest, one achieved this objective in the posttest. The supervisor avatar only addressed the use of appropriate body language objective if the participant did not maintain appropriate body language throughout the session.

Interobserver Agreement for Data Collection

Agreement for Meet-and-greet Session Checklists

Meet-and-greet sessions were evaluated in real-time by the researcher to determine eligibility for potential study participants. Afterwards, 33% of meet-and-greet sessions were randomly selected by the researcher for secondary evaluation by a research associate. The goal of the second evaluation was to establish agreement on the assessments between the researcher and the trained research associate. Agreement was calculated using the formula: (total number of items – number of disagreement) / total number of items (Gast, 2010). The researcher and research associate reached 97% agreement on meet-and-greet sessions.

Agreement for Pretest and Posttest Problem-Solving Scores

Pretest and posttest sessions were evaluated in real time by the researcher to determine problem-solving achievement. Afterwards, the researcher randomly selected 33% of sessions from both the pretest and the posttest subsets for secondary evaluation by a research associate. The goal of the second evaluation was to establish agreement on the assessments between the researcher and the trained research associate. Agreement was calculated using the formula: (total number of items – number of disagreement) / total number of items (Gast, 2010). The researcher

and research associate reached 92% agreement on pretest sessions and 95% agreement on posttest sessions.

Fidelity of Procedures

Training Fidelity

Fidelity of the training procedures, designed to introduce each participant to the study, was measured using a checklist for each research site (see Appendix W). In each case, the training fidelity checklist was completed by a research associate who accompanied the researcher to the research site. In the case of the school and day program research sites, participants attended activities at the sites on a regular basis, therefore it was not necessary to orient participants to some features of the research site such as restrooms and water fountains as it was at the university research site. At these research sites, participants were oriented to where they would meet the researchers and where the avatar interactions would take place. When specific elements of a training checklist did not apply to a given research site research associates were directed to mark the item with "N/A".

Training fidelity checklists were completed at all three research sites. Training checklists were completed in reference to the first day of research activities at each site to coincide with the day participants would receive their introduction to the study. Results from the training checklists indicated that at each research site all applicable elements of the training took place with 100% fidelity.

Avatar Session Fidelity

Avatar interactions were monitored in two ways to ensure consistent experiences across participants as well as alignment with the research objectives for data collection purposes. First, all interactions were observed by the researcher, regardless of whether or not data collection was taking place. This observation was a key component in the maintenance of session fidelity.

In case of a session where the interactor did not follow the designated dialogue guide (see Appendices A and D) or included some other miscommunication, the session was allowed to progress, but directly following the session the researcher reported the discrepancy to the interactor. This facilitated fewer inconsistencies in subsequent sessions. Secondly, all avatar interactions were video recorded, regardless of whether or not data were to be collected during the session. Of the recorded sessions, 33% were randomly selected and evaluated by the researcher to establish fidelity within the research. Of the sessions randomly selected to be evaluated by the researcher, 33% were randomly selected and subjected to a second evaluation of fidelity by a research associate. Rates of fidelity and agreement are described in the following sections by session type and reported in Table 13.

Table 13: Fidelity of Avatar Interactions

Type of Interaction	Fidelity	Agreement
Meet-and-Greet Sessions	100%	95%
Pretest Sessions	100%	99%
Intervention Sessions	96%	88%
Posttest Sessions	99%	96%

Meet-and-Greet Sessions

The purpose of the meet-and greet sessions was to ensure potential participants' abilities to successfully interact with an avatar. In each session, the interactor was to follow a dialogue guide (see Appendix S) to provide the opportunity for each potential participant to achieve each

objective on the corresponding checklist (see Appendix O). The fidelity of the randomly selected meet-and-greet sessions was evaluated at 100%, with agreement of 95% between the researcher and the research associate.

Pretest and Posttest Sessions

In addition to collecting participant achievement data during pretest and posttest sessions, the researcher randomly selected 33% of sessions from both the pretest and posttest subsets to be evaluated for fidelity based on video recordings. Each session was evaluated for fidelity using a checklist (see Appendix V) aligned to the supervisor avatar dialogue guide (see Appendix A). Furthermore, a research associate also evaluated 33% of selected sessions in order to establish agreement. All selected pretest sessions were carried out with 100% fidelity, confirmed with 99% agreement by the research associate. The same percentage of interactions was randomly selected from the posttest subset, with the same percentage also evaluated for agreement. As determined by the researcher, posttest sessions were conducted to 99% fidelity, with one selected session conducted at 80% fidelity and the other 13 conducted at 100% fidelity. The research associate confirmed these findings with 96% agreement.

Intervention Sessions

The researcher randomly selected 33% of sessions from each intervention subset (i.e., Intervention 1, Intervention 2, Intervention 3, and Intervention 4) to be evaluated for fidelity based on video recordings. Each session was evaluated for fidelity using a checklist (see Appendix V) aligned to the peer avatar dialogue guide (see Appendix D). Furthermore, a research associate also evaluated 33% of selected sessions to establish agreement. Intervention 1 sessions were conducted with 91% fidelity, which was confirmed to 91% agreement by the

research associate. Of the seven randomly selected Intervention 1 session videos, four were evaluated at 100% fidelity and three were evaluated at 80% fidelity. Intervention 2 sessions were conducted with 99% fidelity, which was confirmed to 94% agreement by the research associate. Of the seven randomly selected Intervention 2 session videos, six were determined to have 100% fidelity and one was evaluated at 90% fidelity. Intervention 3 sessions were conducted to 94% fidelity, which was confirmed to 75% agreement by the research associate. Of the seven randomly selected Intervention 3 session videos 6 were evaluated at 100% fidelity and one was evaluated at 60% fidelity. Intervention 4 sessions were conducted at 100% fidelity, which was confirmed to 96% agreement by the research associate. The overall fidelity rate for intervention sessions was 96%, with 88% agreement on fidelity between the researcher and the research associate. Most commonly the researcher and research associate disagreed on whether or not the peer avatar provided coaching feedback to the participant.

Perception and Social Validity

All participants in both the treatment and controls groups completed a survey on their perceptions of the avatars, the interactions with the avatars, and the value of the experience as it relates to future employability. Control group participants completed a survey including five dichotomous questions about the supervisor avatar, Ms. Adkins. Treatment group members completed a survey with the same five questions related to Ms. Adkins and five similar questions related to C.J., the peer avatar. Control groups members were not asked questions about the peer avatar, because they did not have interactions with her. Surveys were completed as either a web-based or paper version, and were identical regardless of version. Participants were given the choice to read the survey themselves or ask a research associate or another person for assistance.

A copy of the paper version of this survey, including the questions for both the treatment and control groups, entitled *Perception of In-FORCE Training* can be found in Appendix C.

Five similar questions for each avatar were included in the survey. The first question asked if the avatar appeared realistic. A second question asked participants to share whether or not the avatar's speech seemed realistic, and a third asked participants about the reality of the entire interaction. The fourth question addressed the perceived effect of interactions on participants' problem-solving skills, and the fifth question asked the participant to judge whether or not their interactions with the specific avatar helped them prepare for future employment. All survey data were entered into the IBM SPSS Statistics 21 data file with the data from the checklist instrument and were analyzed using the SPSS software. Results of the survey are included in Table 14. Results are described by question for each group and total results for the supervisor avatar, with which both groups worked.

Table 14: Results of *Perception of In-FORCE Training* Survey

	Question	Treatment Group *n* (%) (*n* = 20)		Control Group *n* (%) (*n* = 22)		Total *n* (%) (*n* = 42)	
		Yes	No	Yes	No	Yes	No
Supervisor Avatar	1. Did Ms. Adkins look like a real boss?	15 (75)	5 (25)	19 (86)	3 (14)	34 (81)	8 (19)
	2. Did Ms. Adkins talk like a real boss?	18 (90)	2 (10)	18 (82)*	3 (14)*	36 (86)*	5 (12)*
	3. When you met with Ms. Adkins did you feel like you were meeting with a real boss?	17 (85)	3 (15)	20 (91)	2 (9)	37 (88)	5 (12)
	4. Do you think working with Ms. Adkins helped you become a better problem solver?	20 (100)	0 (0)	20 (91)	2 (9)	40 (95)	2 (5)
	5. Do you think working with Ms. Adkins helped you get ready for a job?	19 (95)	1 (5)	18 (82)*	3 (14)*	37 (88)*	3 (7)*
Peer Avatar	6. Did CJ look like a real friend?	16 (80)*	3 (15)*	-	-	-	-
	7. Did CJ talk like a real friend?	16 (80)*	3 (15)*	-	-	-	-
	8. When you met with CJ did you feel like you were meeting with a real friend?	17 (85)*	2 (10)*	-	-	-	-
	9. Do you think working with CJ helped you become a better problem solver?	19 (95)	1 (5)	-	-	-	-
	10. Do you think working with CJ helped you get ready for a job?	17 (85)*	1(5)*	-	-	-	-

* one or more responses were left blank or were invalid.

Participants from both groups responded positively to the reality of Ms. Adkins, the supervisor avatar, and C.J., the peer avatar. The value of interactions with both avatars was also reviewed positively by participants in both groups in terms of effect on problem-solving skills and on preparation for employment. The most notable positive perceptions of value towards Ms. Adkins (i.e., response of "yes" to the questions of (1) whether or not interactions with a specific avatar helped the participant become a better problem solver, and (2) whether or not interactions with a specific avatar helped the participant prepare for a future job) came from members of the treatment group.

Summary of Data Analyses

Overall, in the analyses based on RQ1 and RQ2, some positive changes in mean problem-solving scores were observed between the pretest and posttest problem-solving sessions; these changes were more pronounced for the treatment group than the control group. However, because the statistical analyses did not show significance and a low effect size was noted, these results must be interpreted with caution. Individual analyses conducted by objective also revealed a pattern of increased achievement in the posttest, but again the findings lacked statistical significance and showed variability by objective and between groups. Participants' perceptions of the reality and usefulness of the intervention were positive, which may have implications for revised applications of the intervention in the future.

The research procedures were carried out with high fidelity and raters agreed on assessments; however, none of the statistical analyses met traditionally accepted levels of significance. One possible factor contributing to this lack of statistical significance is the variability within the population of people with ID. It is also possible that deficits exist in the

sensitivity of the problem-solving checklist and the specificity of the problem-solving objectives, making statistical significance more difficult to detect. However, another consideration may be the low number of intervention sessions conducted in this study (four, for 20-minutes total intervention time); it may be possible with a low dosage for this population the intervention did have an effect, but it was not readily detectable by statistical standards. These factors, other limitations, and directions for possible future research are discussed in Chapter 5.

CHAPTER FIVE: DISCUSSION

Chapter Overview

Employment rates for individuals with intellectual disabilities (ID) are not comparable to those of peers without disabilities (Bureau of Labor Statistics, U.S. Department of Labor, DOL, 2015; Newman et al., 2011). One possible barrier to gainful employment for people with ID may be underdeveloped problem-solving skills within the realm of social communication (Livermore & Goodman, 2009). Individuals with ID who possessed stronger skills in the area of social communication were more likely to be engaged in independent employment than those with less developed skills (Foley et al., 2013).

If social communication and problem-solving skills are at the core of employability for people with ID (Livermore & Goodman, 2009), more research is needed around these targeted skills. Currently a paucity of instruction and research exists around these skills for people with ID. This lack of research paired with limited education on social communication skills offered to individuals with ID beyond elementary school age (Carter et al., 2010) adds to this skill set being undeveloped or underdeveloped. Additionally, social communication instruction related to workplace situations is not integrated into local, state, or national standards and practices (Langford, 2013; Matsumoto & Hwang, 2013b). These findings indicate the need for targeted

interventions to build workplace problem-solving and social communication skills for individuals with ID.

Beyond the current body of literature on social communication and problem-solving, initiatives to improve employment outcomes are emphasized in current legislative mandates. The 2014 enactment of the Workplace Innovation and Opportunity Act (WIOA) resulted in national discussion surrounding employment opportunities for individuals with disabilities, including those with ID. As an amendment to the 1998 Workforce Investment Act (WIA), the objective of WIOA was to improve access to employment for individuals in the U.S., especially those with barriers to employment, with an emphasis on people with disabilities. Mandates within WIOA included improved access to employment and job-seeking services with an approach based on the needs of individual employees including accessibility to employment training based on both curriculum and physical access. The In-FORCE (Innovative Facilitation of Requisite Communication Skills for Employment) intervention used in this study represented an alignment with these initiatives, with results based on participant perception of the intervention that appear to support In-FORCE as an easily accessible tool for workplace training.

In this chapter, implications and recommendations for the future of employment skills instruction for individuals with ID are offered within the context and limitations of this study. The researcher bridges the study findings to current literature and legislation to inform practice. Additionally, the researcher shares the limitations of the study and recommendations for future research related to the study components and objectives.

Purpose and Procedures of the Study

In this study, the researcher examined the effects of In-FORCE, an intervention to improve problem-solving communication needed in the workplace for young adults with ID. This intervention was created as a result of the need for instruction and research in the areas of workplace skills, communication, and individuals with ID with regards to (a) social communication (Foley et al., 2013; Hughes et al., 2012); (b) peer interaction (Carter et al., 2010; Hughes et al., 2011, 2012; Mautz et al., 2001; Nientimp & Cole, 1992); (c) role play (Cote et al., 2010; Gear et al., 2011; Shepherd, 2009); and (d) virtual reality-based interventions for individuals with ID (den Brok & Sterkenburg, 2015; Passig, 2009; Standen & Brown, 2005; Tam et al., 2005). The positive effects of peer support, role play, and the use of virtual reality for workplace and social outcomes for individuals with ID are clearly established throughout the aforementioned research. The In-FORCE intervention represented a synthesis of peer support, role play, and the use of virtual reality for workplace and social outcomes for individuals with ID.

The In-FORCE intervention included the TeachLivE™ (TLE) virtual environment as the vehicle to facilitate peer problem-solving sessions around workplace problem scenarios. Problem scenarios were developed based on an established soft skills curriculum (U.S. Department of Labor, n.d.), and validated by experts in the field of entry-level employment and individuals with ID. The TLE environment was used for this intervention based on the body of research surrounding its effectiveness as a tool to teach behavior (Dieker et al., 2014; Straub et al., 2014). Research using TLE has been conducted with children (Bukaty, 2014) and adults (e.g., Straub et al., 2014) as well as individuals with disabilities (Bukaty, 2015; Z. Walker, Vasquez, & Wienke, 2016). This cutting edge technology was paired with problem scenarios derived from “Skills to

Pay the Bills" (U.S. Department of Labor, n.d.). This curriculum emphasized socially-based "soft" skills to achieve the goal of maintaining competitive employment, a pronounced initiative within WIOA for people with disabilities.

Individuals who had a formal identification of ID without any other co-existing disabilities were included in this study. The research settings included: (1) a university campus college and career readiness weekend program, (2) a day habilitation facility, and (3) a high school. Multiple research sites were necessary to recruit an adequate number of participants. The diverse nature of the participants from each of these research sites introduced a layer of variability to the sample, which may have contributed to the reduced impact of the intervention in this study.

Participants were assigned to the treatment or control group following the consent process using a matching procedure driven by the Transition Assessment and Goal Generator, Student Version (TAGG-S; Martin et al., 2015). The researcher matched participants into pairs based on the outcome of their composite score for transition skills and randomly assigned one member of each pair to the treatment and control groups using a coin flip. Following the matching the researcher noted the gender and age makeup of both groups were similar, as depicted in Table 2. After being assigned to a group, participants were oriented to the upcoming research activities and completed a meet-and-greet interaction with a virtual avatar. The purpose of the meet-and-greet interaction was to ensure potential participants' abilities to successfully interact with a virtual avatar in an attempt to avoid including participants who would not have an opportunity to benefit from the intervention.

In all, 42 participants completed all research activities associated with either the treatment or control group. Following a successful meet-and-greet interaction all participants in

the treatment and control group watched the pretest problem scenario video and completed the pretest problem-solving interaction, where they discussed with the supervisor avatar the problem presented in the preceding video. This was carried out based on the U.S. DOL (1991) recommendation that future employees must have the ability to recognize a problem and devise a solution and maintain appropriate social skills for success in the workplace. Pretest sessions were conducted during the same visit as the meet-and-greet and took place directly after the meet-and-greet session. During the pretest problem-solving interaction with the supervisor avatar, the researcher completed the *In-FORCE Problem-Solving Checklist* (see Appendix F) in real time for each participant. Pretest interactions lasted about 5 minutes each, and each interaction was video recorded on a smart phone. Interactions were limited to 5 minutes based on the findings that 5 minutes in a mixed-reality environment is perceived as about half an hour of interaction by the participant (Dieker et al., 2008). All participants in both groups also participated in the posttest interaction, which was similar to the pretest interaction with a different problem scenario, also based on the U.S. DOL curriculum (U.S. DOL, n.d.).

Of the 42 participants who completed research activities, 20 were assigned to the treatment group. Each member of the treatment group participated in four 5-minute problem-solving interactions with the peer avatar, between the pretest and the posttest. Each intervention interaction was preceded by a unique problem-solving video, again based on recommendations and materials from the U.S. DOL (n.d.; 1991), and specific to the interaction. Intervention sessions were designed based on the proven benefit of peer interactions for individuals with ID (Carter et al., 2013). Peers, such as the one portrayed by the peer avatar, can act as natural supports, training individuals with disabilities in social communication (Mautz et al., 2001; Nientimp & Cole, 1992).

The researcher analyzed participant achievement on the pretest and posttest administrations of the *In-FORCE Problem-Solving Checklist* (see Appendix F) over time between the treatment and control groups using a repeated measures ANOVA with one factor between. This procedure was used to analyze the verbal problem-solving objectives, the nonverbal problem-solving objectives, and problem-solving objective achievement as a whole. Additionally, each problem-solving objective was explored through non-parametric and descriptive statistics to identify differences in problem-solving achievement based on group assignment. The results of this study are grounded in work with human subjects, all of whom had a disability presenting with a wide range of functional abilities, within a real world setting. These factors lead to some limitations for consideration when reviewing the results of this study.

Current State of Workplace Problem-solving for Individuals with ID

Only 26% of 16 to 64 year olds with disabilities were employed in 2014 (Bureau of Labor Statistics, U.S. DOL, 2015). In comparison the DOL found almost 72% of 16 to 64 year olds without disabilities were employed. Analyses of data from the NLTS2 also confirmed lower employment rates for individuals with ID when compared to the general population (Newman et al., 2011). The employment rate for the sample of participants in this study (21%) was even less than the national average, which may be indicative of a sample of individuals with more severe ID within a population that can vary greatly.

Deficits in communication and social problem-solving skills may pose a challenge for individuals with ID seeking employment (Livermore & Goodman, 2009). As defined by the American Association on Intellectual and Developmental Disabilities (AAIDD), social problem-solving is a skill within the set of *social skills* (Schalock et al., 2010). Social skills are a

component of adaptive behavior, an area of deficit for individuals with ID, by definition (Schalock et al., 2010). Individuals with ID must be able to provide appropriate verbal responses for success in workplaces alongside co-workers without disabilities (Alber et al., 1999). Learning social interaction skills related to employment may be one of the key factors in facilitating successful employment outcomes for individuals with learning disabilities (Johnson et al., 2007). The importance of workplace-related social skills may also hold true for those with ID. Based on the findings of this study and the researcher's interactions with the participants and their families, teachers, and service providers, as well as experts in entry-level employment, workplace-related social skills were valued by employers and coworkers but in many cases were not well developed within the participants. This was more noticeable in the checklist results related to verbal problem-solving. All stakeholders acknowledged that new and innovative ways to address these skills would be beneficial and participants related the understanding that having good workplace communication skills were essential to being successfully employed.

Well-developed communication skills correlate to independent employment outcomes for young adults with ID (Foley et al., 2013). According to Morningstar and Mazzotti (2014), "behaviors and attitudes that facilitate communication and cooperation," including "social problem-solving" (p. 57), within the realm of social skills are beneficial to employment and post-school success for individuals with all disabilities. Many participants in this study showed well-developed non-verbal communication skills during the pretest portion of this study, but lacked the verbal communication skills to engage in a problem-solving conversation with a supervisor.

Transition planning and programming, to prepare students with disabilities (SWD) for post-school outcomes, including employment was mandated as an educational component as of the 1990 authorization of Individuals with Disabilities Education Act (IDEA); however, some of

the participants in this study were not of school age at that time and may not have had access to such programming. Kohler's (1996) research provided the Taxonomy for Transition Programming which classified work-related behaviors and skills as social skills to be addressed in fostering student development. The Taxonomy for Transition Programming was recently updated as the *Taxonomy for Transition Programming 2.0*, and the development of social skills, soft skills, and employment skills was again emphasized within the category of student development (Kohler et al., 2016). Employment or vocational training while in school is recognized as a component of transition as depicted in the Taxonomy for Transition Programming 2.0 (Kohler et al., 2016), and it may not be an experience realized by all participants of this study.

Regardless of educational opportunities afforded to students, the latest trends and legislation such as WIOA to increase inclusive employment and make settings like sheltered workshops a practice of the past apply to all people with disabilities. This means individuals who did not have transition programing while in school, and may have spent two decades or more in a sheltered workshop or another type of day program without any type of work activity may now be expected to engage in community-based employment at a comparable productivity level aside peers without disabilities. This opportunity though may be tempered by the barriers to employment that many people with ID face, including documented deficits in social communication (Livermore & Goodman, 2009). Providing people with ID in all settings with training on problem-solving and social communication is imperative if this shift is going to become a reality for this population.

Appropriate social interactions are not always naturally reinforced in the workplace (Alber et al., 1999). Also, social problem-solving is not often taught, or researched beyond the

elementary years for individuals with ID (Carter et al., 2010). These inconsistencies may be further compounded by the variability in the nature, experiences, and goals of the broad population of individuals of ID. This variability is exemplified even in the comparatively small sample of 42 participants taking part in this study. Based on the information gathered from the demographic survey (see Table 2), 21% of participants indicated engaging in paid employment at the time of the study, whereas 10% had no prior work or volunteer experience at all. Of the participants, 10% indicated they did not wish to obtain employment in the future. A majority of the participants (69%) earned or will earn a special or alternative diploma in lieu of a regular high school diploma. Although in some cases this diploma option is related to regulations in place at the time participants were enrolled in high school, the lack of a high school diploma poses a barrier to employment outcomes. Needing to earn a high school equivalency certification by passing the General Educational Development (GED) exam to enter any career with high school diploma requirements may represent another hurdle impossible for some individuals involved in this study to overcome. The challenge of earning an equivalency certification may be further exacerbated by a need for childcare, health insurance, and other daily living requirements that are difficult to obtain without regular income and employment benefits. Examination of these barriers should not be misconstrued as a suggestion that inclusive employment initiatives are ill-advised or doomed to fail, however, barriers should be understood and addressed to help people with ID, and those who support them, navigate towards success.

Just as society's definition and acceptance of individuals with ID has changed over time, so must the levels of support offered and the types of preparation made so everyone has an opportunity to reach his or her full potential. At the beginning of the 20th century, people with ID were institutionalized, in an attempt to protect them from the world around them (Barnett, 1986).

This practice, which was initiated with a focus on helping people through training and habilitating them for community inclusion, soon deteriorated into a model providing only baseline custodial care (Rochefort, 1981; Rosen, 1984). In the middle of the 20th century, societal shifts surrounded the civil rights movement, widely noted by the 1954 Supreme Court decision regarding *Brown v. Board of Education* to abolish racial segregation in schools. Although this legislation did not directly impact rights for individuals with disabilities it is frequently referenced as an impetus for public education for SWDs (Brownell et al., 2010; Rudd, 2002). In the decade following *Brown v. Board of Education* the need for rights for SWDs gained federal recognition with a 1966 amendment to the Elementary and Secondary Education Act (ESEA) creating an office within the U.S. Department of Education (U.S. DOE) specifically for education initiatives for SWDs. Shifts in educational programming are mirrored in employment context, where a series of legislative actions have increased employment opportunities for people with disabilities. From veterans who benefitted from the Soldier's Rehabilitation Act of 1918, to the requirement of reasonable accommodations for employment brought about by the Americans with Disabilities Act (ADA; 1990) and including the focus on individuals with disabilities in WIOA the societal landscape continues to evolve. The employment preparation we offer to individuals with disabilities, including those with ID must evolve with these changes. Many individuals with ID can now expect access to inclusive employment opportunities, yet the question remains: Is this population prepared for workforce entry and successful, sustained employment outcomes?

Innovative methods of preparation, like the In-FORCE intervention studied in this research may offer valuable information and tools for training or retraining individuals with ID to be successful in the workforce. The variability of this population combined with the variability

of preparation in both workforce and inclusive settings has equal extremes which may make it difficult to gauge immediate impact of an intervention and create a barrier to potential large-scale studies. Instead rigorous case study, single case, and qualitative research needs to build the foundation by following any intervention to the outcome of sustained employment. If a key component of employment for people with ID is problem-solving and social communication then tools for developing employment skills and behaviors, like In-FORCE, need to be studied for effectiveness, further pursued, and perhaps embedded into job training and workforce coaching.

Implications for Problem-solving Interventions

With legislative initiatives such as WIOA with an emphasis on individuals with disabilities working in inclusive settings earning minimum wage or more to the greatest extent possible, the need for opportunities to learn necessary skills for employment, will continue to increase. The findings of an examination of current literature, conducted by the researcher, targeting interventions related to setting a foundation for workplace and transition success for individuals with ID are included in Table 1. Based on analysis of the research, multiple approaches emerged to increase social skills and workplace problem-solving communication for individuals with disabilities; however, the quantity of studies, especially those conducted using group experimental techniques, was limited.

The results of the analyses conducted in this study indicated positive change for the treatment group. This change was especially pronounced in the subset of verbal problem-solving where the treatment group exhibited a positive change while the mean for the control group from pretest to posttest decreased, yet statistical significance was not achieved. The sample size was adequate to meet the a priori power analysis conducted using G*Power 3.1. Also, the use of the

matching procedure ensured increased equivalence between the treatment and control groups, which was evidenced by the results from the demographic survey, presented in Table 2 and confirmed by the non-significant results of Levene's Test for Equality of Variances for the dependent variables in RQ1 and RQ2. This lack of statistical significance, could be due to the variability in the population of individuals with ID, data from a larger sample may have produced more remarkable results, or may mask the variety of outcomes within a population as diverse as those with ID. Similar to the findings of Mautz, Storey, and Certo (2001), it is possible that no one strategy will be effective alone, but rather a combination of strategies may improve social interactions.

Another consideration is the breadth of skills needed for workplace success. Soft skills include a variety of communication, problem-solving, and teamwork skills related to workplace success, but not involving job-related tasks (U.S. Department of Labor, n.d.). With such a broad collection of skills, researchers focused on people with ID must ask: Do we really have an effective way to quantify and assess these skills at this time? Without an effective method of assessment validated across not only the expansive population of individuals with ID, but also the labor force in general, an overarching challenge for the field of labor is to determine achievement of skills and status of preparation for employment outcomes for all persons, including individuals with ID.

Based on findings from the *Perception of In-FORCE Training* survey (see Appendix C) depicted in Table 14, participants from both groups found their interactions with the avatars realistic and valuable to problem-solving and future employment despite the lack of statistically significant results. Interestingly value of these outcomes was reported most positively from members of the treatment group in regards to Ms. Adkins, the supervisor avatar. It is possible

that an unintended effect the intervention interactions with C.J., the peer avatar, was increased realization by members of the treatment group of the value of practicing workplace communication interactions with a supervisor, as all participants did in the pretest and posttest. A possible explanation for these favorable responses may be acquiescence, as defined by Gall, Gall, and Borg (2007). However, in addition to the survey results, participant satisfaction was noted anecdotally by members of the research team, staff members at the day habilitation facility, and family members of some participants.

Several participants indicated to the researcher they felt the intervention package, and even the pretest and posttest interactions, were valuable experiences, socially validating the In-FORCE intervention. Participants acknowledged the reality of the problem scenarios, in some cases even relating to the researcher or the avatar they had encountered similar situations in their own work experiences and had felt conflicted or unsure of how to proceed. Although some participants shared on occasion that they were nervous to meet with the supervisor avatar, in most cases the same individuals acknowledged that communicating with your boss was an important component of employment and acknowledged the benefit of the opportunity. Several participants reported enjoying their conversations with the peer avatar during intervention sessions, indicating that they viewed her as a peer and appreciated her ideas. One participant went as far as to formally thank the supervisor avatar following her posttest session, and asked her to share her appreciation with the peer avatar, saying:

> You know what Ms. Adkins, you and C.J. helped me a lot…You know what, I'm gonna miss you and C.J., so, um, with everything you all have taught me I'm gonna take your advice…Thank you.

Implications for Mixed-Reality Simulation

Technology already improves daily functioning for some people with disabilities, and its applications are continually expanding (Edyburn, 2013). Use of virtual reality (VR) to create social situations in a virtual environment is one such application (Cobb, 2007). Virtual reality has also been shown to have benefits towards improving work and social skills (den Brok & Sterkenburg, 2015; Standen & Brown, 2005). Skill increases noted through VR use have even been found to carry over into real world interactions (Straub et al., 2014; Tam et al., 2005). The mixed-reality environment of TLE combines the low-stakes effectiveness of VR with life-like personalized interactions (Dieker et al., 2008). Recently, the commercial partner of TLE used mixed-reality simulation to train hotel front desk staff and noted overall customer satisfaction gains following employee participation in the training, with the strongest gains noted in the area of problem resolution (Mursion, Inc, 2016).

Quantitative data were not collected specifically on the use of mixed-reality simulation in this study as a comparison to other types of interactions; however, there are several examples within the study of the consistency facilitated by the use of the virtual environment. The consistent appearance and character of the peer and supervisor avatars is one such feature. Regardless of the day, time, interactor, or research site, each avatar maintained the same appearances, personalities, and characteristics. This allowed control of the intervention, as well as opportunities for the avatars to develop rapport with the participants.

Based on findings from the *Perception of In-FORCE Training* survey (see Appendix C) displayed in Table 14, participants in both the treatment and the control groups had positive perceptions of the reality of the virtual avatars in regards to the avatars' appearances ($\geq$ 75%), speech ($\geq$ 80%), and overall interactions ($\geq$ 85%). Participants in both groups also felt that

working with the avatars was valuable to problem-solving skills (> 90%) and preparations for employment (> 80%). These findings may suggest the value and consideration of the continued use of virtual avatars for training purposes for people with disabilities, both in the realm of social skills and work readiness.

Anecdotally, during interactions, participants in both groups appeared to become more invested in interactions and eager to engage with the avatars when interactions were personalized by the avatar. This engagement was achieved not only by the avatar using the participants' names but also by commenting on features such as an article of clothing they were wearing, something in the room, or referring to something specific that the participant indicated interest in, such as a favorite author, movie character, or theme park attraction. These instances of personalization were more common in meet-and-greet and intervention sessions, where the dialogue was more casual and open. The feature of personalization is unique to the mixed-reality TLE interface used in the In-FORCE intervention. This personalization is critical when working with individuals with ID who have extremely diverse backgrounds and needs, it may even help address potential deficits in adaptive behavior by building familiarity. Using In-FORCE customized to a job setting and individual employment concerns is a logical next step for this research. This customization and personalization provides a safe environment to practice critical skills for sustained employability.

Reconceptualizing Research for Individuals with ID

Educational opportunities and employment preparation have not been consistent either across states or classrooms and certainly have not been standardized throughout history for people with ID. The availability of public education for people with disabilities was not

mandated until the passage of P.L 94-142 in 1975, and transition planning was not formally introduced into educational programming until the 1990 passage of IDEA. Based on an analysis of the NLTS2 data, Cameto, Levive, and Wagner (2004) found transition planning and programming varied across age, disability category, and other demographic characteristics. The call for more comprehensive programming was introduced in 2014 through the WIOA. Although predictors for post-school success have been identified (Test, Fowler, & Kohler, 2013), specific needs within transition planning for students with ID remain largely unidentified (Carter, Brock, & Trainor, 2014). Transition planning within current legislation requires the identification of post-secondary outcomes and alignment with activities to help students achieve those outcomes, but the alignment of those practices for students with ID, as with other SWD, vary from school to school, district to district, and state to state. These variances in preparation for achieving workplace skills results in a variance in the skill set of this population of students, and in turn suggest that an expectation of uniform or predictable levels of preparation for employment among individuals with ID of working age (i.e., 16 - 64 years old) is not realistic. This variability in preparation may improve with the increasing identification of evidence-based practices such as those in the newly revised Taxonomy for Transition Programming 2.0, but in order to meet the needs of the current population of potential employees with ID, researchers and practitioners must consider the past inconsistencies and variability in workforce preparations experienced by many individuals with ID.

As a result of these historical inconsistencies, the findings from the current study surrounding In-FORCE training could be influenced by the demographics of the sample. Participants ranged in age from 16 to 65, meaning some were as old as 25 before P.L. 94-142 was passed. More than 25% of the participants in this study were over the age of 47, meaning

they were older than 21 when transition planning was first added to the IDEA in the 1990 reauthorization and unlikely to have received any formalized version of these services. Finally, participants were engaged in different levels of service provision at the time of this study; some were still enrolled in school, others were accessing community activities on their own, and others were attending a day program between one and five days per week. These differences, and the varied experiences that accompany them, may have contributed to the lack of statistical impact of the In-FORCE intervention.

Despite recent national initiatives to end sheltered workshops for people with ID (Hoff, 2014), many individuals have been prepared for a career of sub-minimum wage earnings. Now these individuals will have the opportunity to capitalize on initiatives mandated by WIOA to be competitively employed and included in the workforce alongside people without disabilities However, some individuals with ID may have spent 40 or more years working in sheltered workshops, or attending programs that offered little or no realistic work experience. A lack of preparation may be further complicated by resistance to change stemming from deficits in adaptive behavior characteristic of individuals with ID (Schalock et al., 2010). The implications of this shift represent a potential barrier to employment outcomes for people with disabilities, especially this traditionally segregated population. Experts in the field of transition and post-school outcomes need to explore any and all options to develop workplace skills for individuals who have only experienced sheltered workshops prepare for more inclusive workplace opportunities.

An additional challenge that individuals with ID face within the shift to inclusive community employment lies within the definition of ID itself. Deficit in adaptive behavior is one of the three characteristics included in Schalock and colleagues' (2010) definition of ID.

Adaptive behavior refers to an individual's ability to adjust and revise behaviors based on changes and events in his or her surroundings (Schalock et al., 2010). Decreased ability to adapt may mean that individuals with ID who have not had experience in inclusive employment settings may struggle to thrive in these settings without specialized training. The reduced ability of people with ID to adapt to new experiences in such a short time may also have been a fault in the design of this study. This study was developed based upon earlier findings indicating four sessions in the simulator produced behavior change (Straub et al., 2014). This may not have been enough exposure to create significant impact for this population. Future research should further explore time to acclimate in any environment as this population transitions to more inclusive workplace environments. Also, more explicit, direct instruction around problem-solving skills may increase the impact of the intervention.

Large *n* Research for Individuals with ID

Even with the need for specialized training surrounding workplace skills, challenges with adaptive behavior as described by Schalock and colleagues (2010) may lead to less noticeable impact of training and interventions to build these skills. The combination of adaptive behavior deficits and the very broad definition of ID, which encompasses individuals with a wide range of functional abilities (Schalock et al., 2010), may indicate that traditionally accepted standards of research need to be reconsidered. When working with a population marked by great variability, also resistant to change and adaptation, the expectation of statistical significance in a group design study with an alpha level of .05 may result in the rejection of potentially successful interventions. This failure to acknowledge change would constitute a Type II error (Gall et al., 2007). Development of more standardized employment skills training and transition planning

may mitigate some of the variability. Even if consistency in practice occurs researchers and practitioners still may need to consider other standards for identifying potentially useful practices for providing learning opportunities and advancing inclusive workplace employment for students with ID.

Workplace skill interventions for individuals with ID fit Sauro's (2015) description of research that may be best analyzed with an alpha level complementary to *exploratory confidence.* A traditional alpha level of .05 indicates 95% confidence in the results of an analysis (Stevens, 2007). In contrast, exploratory confidence is the idea that in the early stages of development, when a researcher is looking for only reasonable evidence that an intervention carrying minimal risk may be effective setting the alpha level at 0.20 is appropriate (Sauro, 2015). This study incorporates a newly designed intervention, carrying minimal risk to participants, delivered at a low dosage as not to disrupt participants' regular schedules (i.e., participation in intervention sessions required treatment group members at work and school sites to step away from regularly scheduled activities for less than 1 hour total). When analyzed with an alpha level of 0.20 the change in verbal problem-solving achievement based on group assignment, as depicted in Table 6 would be considered significant. This targeted skill is the area in which the researcher anticipated the greatest impact, given indications in the pilot study that many participants entered the study with acceptable nonverbal problem-solving skills, a characteristic also reinforced and perhaps replicated in this study. Using the researcher's expertise with this population, based on the results when exploratory confidence is considered, and from the qualitative findings that participants felt the virtual avatar interactions improved their employability skills, further research with In-FORCE is warranted.

Another consideration in the design of research surrounding workplace skills for people with ID may be to evaluate the types of studies designed (Carter et al., 2014; Carter, Sisco, Chung, & Stanton-Chapman, 2010). Accepted standards within the field of special education indicate that an evidence-based practice can be identified only if the practice is tested using group design research (What Works Clearinghouse™, n.d.). Because of the marked variability within the population of people with ID, larger samples make homogeneity less likely, and also with the varied population, what works for one person with ID may not be effective for another.

At this time, there is a dearth of research surrounding the identification of effective practices for building communication skills for individuals with ID (Carter et al., 2010). Still, communication skills have been noted, throughout current research, as critical skills to successful employment outcomes (Foley et al., 2013; Livermore & Goodman, 2009). Given (1) the high value placed on workplace skills, such as communication; (2) the lack of research and intervention surrounding these skills; and (3) the wide range of strengths, needs, and characteristics possessed by individuals with ID, efforts to build an evidence base should be directed by considerations aimed at identifying potentially effective interventions. Researchers should consider the use of exploratory confidence to identify practices that may hold potential to increase workplace skills for some individuals with ID. Also, researchers should look to single-case design as an avenue for exploring practices and entering them into the evidence base considering the unique nature of students with ID. Although single-case research is not currently accepted towards the development of an evidence base by What Works Clearinghouse criteria, the entity regularly consulted for research standards in special education, guidelines surrounding high quality execution of single-case research should be a consideration for this population. Guidelines for high quality single-case research have been established by the Council for

Exceptional Children (CEC, 2014) and the National Technical Assistance Center on Transition (NTACT, 2015).

High quality single-case studies focused on workplace skills for individuals with ID may create an avenue to inform the field of effective practices for smaller groups of individuals with ID. Broadening the criteria of evidence-based practices for students with ID in workforce skill development due to the inconsistency in past training and the variability of this population may help develop an evidence base around innovative practices in workplace skills interventions. The critical need for immediate and ongoing skill development of people with ID to facilitate successful inclusive employment demands nontraditional thinking, approaches, and practices.

These statements are not made to negate the lack of statistical significance of this study but to challenge the field to think about the individualized nature of individuals with ID and the potential limitations of large group designs for this population. This study may have led to further changes if additional time in the simulator occurred or if a stronger and more sensitive assessment measure were used. In addition, if a large *n* of individuals all close in age with reliable and comparable IQ scores could be accessed additional findings may have emerged. One outcome of this study is the establishment of procedures and findings that will serve to inform future research.

Technology in the 21st Century

Researchers also should consider how to embrace the rapidly changing technological landscape. While prospective employees face challenges in adapting to new personal and professional technology while developing an understanding of appropriate use of these technologies such innovations may be leveraged to improve workplace skills. Technology such

as virtual reality can offer low-stakes opportunities to practice and develop skills (Dieker et al., 2008). Additionally, learning experiences may be customized and targeted towards specific skills (Standen & Brown, 2005). Further personalization is possible through the use of mixed-reality technology such as the TLE environment used in the In-FORCE training (Dieker et al., 2008). Considering the benefits of technology and virtual environments, it is possible that the effects of these technologies may be more readily quantified when used to target specific job-related tasks such as the positive results noted by Mechling and Ortega-Hurndon (2007) in which three young adults with ID successfully learned multi-step job tasks in a simulated environment.

Based on participant responses to the demographic survey (see Appendix E), 67% of participants accessed the internet on a daily basis, and more than half had cell phones allowing them to do so, suggesting familiarity with technology. Further examination of the demographic responses led the researcher to observe familiarity with technology was less common among participants over the age of 40 than those who were younger. These positive reports, when considered with the familiarity of the technology demonstrated by the younger participants and the research base indicating the usefulness of technology-based interventions for people with ID, suggest that the adoption of innovative personalized learning tools should be considered for building workplace skills for individuals with ID. This personalized learning may be especially important as this younger generation transitions out of school to enter the workforce.

Summary of Findings

The results of the research showed positive, but not statistically significant changes following the implementation of the intervention. The treatment group showed positive change in means in both the verbal and nonverbal subsets, as well as the overall problem-solving

achievement score. The control group showed negative change in verbal problem-solving and positive change in nonverbal problem-solving, resulting in an unchanged mean overall problem-solving score from pretest to posttest. The high achievement in nonverbal problem-solving in the pretest for both the treatment (M = 4.75 out of 5) and control (M = 4.55 out of 5) groups may have contributed to the negligible changes that occurred in this area.

Most of the participants were very eager to interact with the virtual avatars, based on the researcher's observations. Some participants were apprehensive about their first interactions but gained confidence in subsequent interactions, an unintended benefit of the meet-and-greet session. Parents and guardians of participants, as well as staff at the adult day program, reported multiple cases of participants looking forward to subsequent research sessions and considering how to best approach problem scenarios for future interactions, which may be considered as possible contribution to the positive changes in problem-solving scores.

The positive outcomes of this study have the potential to expand the practice of career skills development for young adults with ID. In alignment with the priorities of WIOA, In-FORCE may represent an innovative, comprehensive intervention to build social communication skills integral for workplace success. The In-FORCE intervention is applicable to transition and career training settings with minimal risk and time commitment to work on targeted skills. This intervention, if established as an effective tool for building workplace communication could easily be scaled across the U.S. using TLE technology, which is already being used in over 80 colleges and universities across the country in teacher preparation. Furthermore, continual technological developments have made it easier for researchers, and even practitioners, to offer TLE interactions on personal computing devices without an elaborate set-up. This intervention also may prove valuable to potential employees with other disabilities, those without disabilities,

and any person who needs to build necessary social communication skills to obtain or improve career outcomes.

Limitations of the Study

In an attempt to minimize limitations of this study, the researcher identified several potential threats to validity before carrying out research activities. These potential threats, explained in Table 3, were considered in the design of the study and controlled to the extent possible. Other limitations surfaced during research activities and analysis that should be considered along with the results of this study and for reference in consideration of future research.

The researcher-created *In-FORCE Problem-Solving Checklist* (see Appendix F) represents a limitation in this research. The researcher established validity by including skills recommended by the U.S. DOL and validated the content of the tool with experts in the fields of post-secondary transition and employment outcomes. The checklist was also aligned with research-driven and expert vetted frameworks of post-secondary and employment skills. Furthermore, this instrument was used in the spring 2015 pilot study conducted by the researcher, in which the researcher and another observer reached greater than 80% agreement on observed sessions based on initial data analysis. Despite these strengths, the nature of the tool and the absence of a large-scale examination of the reliability of this item may pose a threat to the strength of the final analysis (Gall et al., 2007). Additionally, this 10-item, dichotomous checklist may not have been a sensitive enough instrument to reveal nuanced changes in participant behavior.

The short duration of the intervention interactions, with members of the treatment group interacting with the peer avatar for only 20 minutes in total, as depicted in Table 15, may have posed a limitation in the research. The overall duration of the intervention interaction was driven by both cost and past research related to behavioral changes observed in mixed-reality virtual environments. Research shows that 5 minutes of interaction in a virtual environment is equivalent to 30 minutes of in-person interaction in terms of emotional taxation on a participant (Dieker et al., 2008). Also, the cost of hosting interactions in the TLE environment is $120 per hour. Therefore, each member of the treatment group was able to practice the workplace problem-solving communication skills targeted in the In-FORCE intervention at the rate of $40 per participant. This cost for a targeted skill training seemed reasonable and starting with the least intrusive and minimum expenditure was determined important for this first large *n* study with this population. The cost factor was especially important because the participants, families, and organizations were not responsible for any of these costs. For a low per-participant price, and a minimal amount of time away from regular daily activities, the participants' positive change in problem-solving communication was noted despite the change not reaching statistical significance.

Table 15: Time of Participation in In-FORCE Intervention Interactions

Session	Treatment Group Duration (mins.)	Control Group Duration (mins.)
Intervention 1	5	0
Intervention 2	5	0
Intervention 3	5	0
Intervention 4	5	0
Total	20	0

Another limitation is posed by the varied population of individuals with ID. The accepted definition, surrounding IQ, adaptive behavior deficits, and age of onset still represents

individuals with a wide range of abilities and characteristics (Schalock et al., 2010). In addition, the researcher requested only self, guardian, or staff report of ID, so there remains the possibility that in some cases, participants' classifications of disability were misrepresented. The researcher attempted to mitigate this variability as much as possible and fortify the homogeneity of the treatment and control groups by matching participants into pairs based on their overall scores on the TAGG –S. One member from each pair was assigned to the treatment and control groups using a coin flip. Originally, the researcher hoped to match participants by IQ score, however, with the exception of one participant, IQ scores were not reported by participants and guardians. Discussions with several parents and guardians led the researcher to understand that some participants had never had IQ tests while some participants had not had IQ tests updated since before they entered high school.

Additionally, participants were recruited from three distinct groups, members of a community organization, adults enrolled in a day program, and students attending public school. The factors surrounding their prior experiences were certainly different, and in some cases the setting in which they participated also may have had an effect on problem-solving achievement. The setting from which participants were recruited was not a variable considered in matching participants, rather all participants were matched as a whole sample. Hence, the experience and exposure to job skills may have varied based upon the setting and was not controlled in the research.

The research settings also introduced another variation to the sample. In each setting participants had opportunities to interact with other participants in both the treatment and control groups due to the other, group-based activities going on at the site. It is possible that participants may have had discussions related to the problem scenarios, avatars, or other elements of the

research outside of the research settings. Also in each setting the participants were engaged in social interactions with members of the research team before and after research sessions. These interactions included introductions and pleasantries. While these interactions did not focus on the content of the research beyond the researcher scripts, they still provided opportunities to practice social skills, especially nonverbal communication skills. Furthermore, the avatars only prompted nonverbal communication skills if participants did not achieve them. This controlled prompting was the case for pretest, posttest, and intervention sessions. Unlike the verbal skills, nonverbal skills were only addressed with feedback if they were not achieved.

All research involving human subjects stands to be compromised to some degree by external factors. Through all phases of the research, the researcher and research associates noticed instances where participants appeared distracted by external events. These included fixation on upcoming activities not related to the research, references to events or incidents that had happened in the past, or in some cases, general distraction for reasons not evident to members of the research team. Such incidents may have affected participant performance in interactions, resulting in an inaccurate assessment of problem-solving abilities.

The nature of the families of the participants of this study may lead to reduced generalizability, posing another limitation in this research. A portion of the participants was recruited from a group of young adults with ID who associate with organizations for individuals with ID. Also, this segment of participants was required to arrange their own transportation to the research site. Both of these characteristics required commitment and extra effort from family or other advocates. It is possible that individuals with family members or other supportive associates may be prone to different outcomes than individuals without this support, who may be overlooked as participants in this study.

Finally, though several TLE interactors have been trained to deliver the In-FORCE intervention between the pilot study and this research, one interactor had primary availability during the data collection period and carried out most of the research sessions. Sessions completed by this interactor maintained strong fidelity throughout data collection. A number of sessions at the school site had to be scheduled at a time when the primary interactor was not available. For these sessions, a different interactor was trained and completed the sessions. Despite strong effort, lower, but still acceptable, fidelity was recorded across these sessions. While still within the bounds of fidelity established by the researcher prior to research activities, it is possible the difference affected the overall research outcomes.

Recommendations for Future Research

Several considerations for themes, components, and elements of future research emerged as a result of this study. In terms of the instrument used in this study, the potential for revisions should be considered. In addition to being a researcher-created item, it is possible that the instrument used in this study was not sensitive enough to detect discrete changes in participant behavior, as it was used in an attempt to quantify problem-solving ability in a 10-item dichotomous checklist. A more sensitive version, or more sensitive instrument entirely may be a worthy consideration. Additional time, or additional intervention sessions may be needed and may vary based upon the individual to lead to more measurable results.

Within research design, more conclusive results may be found if research is focused on a more specific skill set and more specific target behaviors. The need for improved problem-solving skills in individuals with ID has been established in the literature, but specific fields or vocations in which these skills are to be applied should be considered. More remarkable, and

informative results, as well as a more concrete baseline of skill achievement may be obtainable through work with a group of individuals with career aspirations or experiences within a specific field, to which interventions could be customized. Furthermore, this specificity may allow for targeted follow up to examine long-term employment outcomes, something that would be difficult to quantify with the diverse career aspirations and trajectories of the sample participating in this study. In alignment with the researcher's suggestion to explore single-case design, some type of follow-up, possibly in the form of a probe to explore maintenance of the skills may lend insight to the findings.

In addition to vocation-targeted intervention, a larger, more homogeneous population may lend strength to research findings. If the researcher is able to target a specific age, ability, or interest group within the larger population of people with ID, generalizability may be reduced as a short-term result, but a strong, more customized intervention may be developed and later customized or broadened to other subgroups. It may also be helpful to consider length of participant sentences, in analysis, as this may yield further insight into communication baseline.

Conclusions

Employment outcomes, problem-solving, and other social communication skills continue to be a targeted outcome for many people, including, and some may say especially, those with ID. These initiatives are strengthened by advancing educational initiatives and federal legislation such as WIOA, with articulated goals of competitive, inclusive employment outcomes for almost all individuals with disabilities. Current U.S. DOL statistics indicate that this goal is not being realized, and substantial progress stands to be made if that goal is to be realized (Bureau of Labor Statistics, U.S. DOL, 2015).

Currently large-scale problem-solving and social skills research for young adults and adults with ID is not being conducted (Carter et al., 2010). Without such research, it is impossible to construct an evidence base around strategies for building the social and communication skills necessary for individuals with ID to achieve employment outcomes. This study represents an attempt to ignite an evidence base surrounding these critical life skills. Although the results do not reveal the statistical significance necessary to achieve that objective immediately, the anecdotal and social validity findings associated with this research, and surrounding the incorporated technology were positive and warrant additional consideration. The DOL (n.d.) assertion that soft skills for employment, including communication and problem-solving, need to be practiced and reinforced regularly, supports the claim that consideration of interventions to build these skills must continue.

The emphasis on employment outcomes, coupled with the documented lack of a research base surrounding workplace problem-solving communication skills indicates the need for this line of research to continue. Driven by promising technologies and based on the findings and limitations of this research, interventions to advance employment outcomes for people with ID may be developed and validated. Subsequent long term effects of increased employment outcomes may include improved societal contributions and quality of life of individuals with ID.

APPENDIX A:
PRETEST/ POSTTEST INTERACTION DIALOGUE GUIDE

Supervisor Dialogue Guide
5 minute sessions –LIMITED PROMPTING

1. Salutation

2. Begin the conversation… e.g., "I asked you to meet today because there was a problem at work…"

3. Ask: "Can you tell me what the problem was?"
   If no response: "The problem was…"

4. Ask: "Why is that a problem?"
   If no response: "It can be a problem because…"

5. Request a solution
   If no response: Move to question

6. Ask a question to clarify something the participant said (see questions)
   If no response: "Okay, let's try another question."

Clarifying Questions:

Pre-test	Pink card	Scenario 5	What should you do if you do not know where to put something away at work?
Post-test	Purple card	Scenario 3	What can you do when your boss asks you to work on a project with co-workers?

7. Ask a critical question… e.g., "I am concerned that ___ may not work out, how can you make sure it does?", "What if ___ happens?" (see questions)
   If no response: "Okay, we'll keep thinking about that."

Critical Questions:

Pre-test	Pink card	Scenario 5	What if you are confused about something at work but you cannot find your boss or a person in charge to help?
Post-test	Purple card	Scenario 3	What if a group project at work is not going well and you are having trouble working with your co-workers?

8. Other prompts **(only use if participant doesn't meet criterion):**

- *Please speak up/ don't raise your voice (voice control)*
- *Don't talk while I am talking (pause to listen)*
- *Look at me when I am speaking/ when you talk to me please (eye contact)*
- *Please don't cross your arms like that (body language)*

9. Thank the participant for meeting with you today.

APPENDIX B:
PROBLEM-SOLVING OBJECTIVES ALIGNED TO TAXONOMY FOR TRANSITION PROGRAMMING 2.0 AND FRAMEWORK FOR 21ST CENTURY LEARNING

Problem-Solving Objectives, Defined and Aligned

			Taxonomy for Transition Programming 2.0		*Framework for 21st Century Learning*		
	Objective	**Operational Definition**	**Student Development Subset**	**Practice**	**Student Outcome**	**Skill**	**Characteristic**
1.	**Restate the problem**	Repeat or rephrase the problem identified in the scenario.	Employment and Occupational Skills	• Soft skills development	Life and Career	Initiative And Self-Direction	• *Work Independently* • Monitor, define, prioritize, and complete tasks without direct oversight
2.	**Describe why it is a problem**	Offer at least one reason or explanation to describe why the problem identified in the scenario would have a negative impact in the workplace.	Life, Social, and Emotional Skills	• Self-determination skills development (e.g., problem-solving) • Interpersonal Skills Development	Life and Career	Social And Cross-Cultural Skills	• *Work Effectively in Diverse Teams* • Respond open-mindedly to different ideas and values
			Employment and Occupational Skills	• Soft skills development	Learning and Innovation	Critical Thinking and Problem Solving	• *Make Judgments and Decisions* • Analyze and evaluate major alternative points of view • Synthesize and make connections between information and arguments
3.	**Describe a solution**	Provide at least one reasonable and achievable course of action to address the current problem identified in the scenario.	Life, Social, and Emotional Skills	• Self-determination skills development (e.g., problem-solving, decision making) • Interpersonal Skills Development	Life and Career	Initiative And Self-Direction	• *Work Independently* • Monitor, define, prioritize and complete tasks without direct oversight

	Objective	Operational Definition	*Taxonomy for Transition Programming 2.0* Student Development Subset	Practice	*Framework for 21st Century Learning* Student Outcome	Skill	Characteristic
3.	**Describe a solution (continued)**	Provide at least one reasonable and achievable course of action to address the current problem identified in the scenario.	Life, Social, and Emotional Skills	• Self-determination skills development (e.g., problem-solving, decision making) Interpersonal Skills Development	Life and Career	Productivity And Accountability	• *Produce Results* • Demonstrate additional attributes associated with producing high quality products including the abilities to: Collaborate and cooperate effectively with teams
					Life and Career	Flexibility And Adaptability	• *Be Flexible* • Understand, negotiate, and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments
					Learning and Innovation	Critical Thinking and Problem Solving	• *Solve Problems* • Solve different kinds of non-familiar problems in both conventional and innovative ways

	Objective	Operational Definition	*Taxonomy for Transition Programming 2.0* Student Development Subset	Practice	*Framework for 21st Century Learning* Student Outcome	Skill	Characteristic
4.	**Answer clarifying question from supervisor avatar**	Offer a reasonable response to a question asked by the supervisor avatar as a prompt to clarify or restate something the participant said in the session.	Life, Social, and Emotional Skills Employment and Occupational Skills	• Self-determination skills development (e.g., problem solving, self-advocacy) • Interpersonal Skills Development • Soft skills development	Life and Career	Flexibility And Adaptability	• *Be Flexible* • Incorporate feedback effectively • Deal positively with praise, setbacks, and criticism
5.	**Answer critically phrased question from supervisor avatar**	Offer a reasonable response to a question asked by the supervisor avatar presented in a manner that challenges something stated by the student.	Life, Social, and Emotional Skills Employment and Occupational Skills	• Self-determination skills development (e.g., problem solving, self-advocacy) • Interpersonal Skills Development • Soft skills development	Life and Career	Flexibility And Adaptability	• *Be Flexible* • Incorporate feedback effectively • Deal positively with praise, setbacks and criticism
6.	**Voice control**	Maintain intelligible voice volume and dictation during interactions.	Life, Social, and Emotional Skills	• Social skills Development	Life and Career	Social And Cross-Cultural Skills	• *Interact Effectively with Others* • Conduct themselves in a respectable, professional manner
7.	**Pause to listen**	Do not attempt to speak over the supervisor avatar.	Life, Social, and Emotional Skills	• Social skills Development	Life and Career	Social And Cross-Cultural Skills	• *Interact Effectively with Others* • Know when it is appropriate to listen and when to speak

	Objective	Operational Definition	*Taxonomy for Transition Programming 2.0* Student Development Subset	Practice	*Framework for 21st Century Learning* Student Outcome	Skill	Characteristic
8.	**Make eye contact when listening**	At least once during each statement spoken by the supervisor avatar	Life, Social, and Emotional Skills	• Social skills Development	Life and Career	Social And Cross-Cultural Skills	• *Interact Effectively with Others* • Conduct themselves in a respectable, professional manner
9.	**Make eye contact when speaking**	At least once during each statement spoken by the participant	Life, Social, and Emotional Skills	• Social skills Development	Life and Career	Social And Cross-Cultural Skills	• *Interact Effectively with Others* • Conduct themselves in a respectable, professional manner
10.	**Use appropriate body language**	Maintain open posture with head raised during the majority on the session.	Life, Social, and Emotional Skills	• Social skills Development	Life and Career	Social And Cross-Cultural Skills	• *Interact Effectively with Others* • Conduct themselves in a respectable, professional manner

APPENDIX C:
PERCEPTION SURVEY – TREATMENT GROUP VERSION

Participant Code: _____

Perception of In-FORCE Training

Circle your answer choice.

START HERE

Think about every time you've met with Ms. Adkins:

		Yes	No
1.	Did Ms. Adkins look like a real boss?		
2.	Did Ms. Adkins talk like a real boss?		
3.	When you met with Ms. Adkins, did you feel like you were meeting with a real boss?		
4.	Do you think working with Ms. Adkins helped you become a better problem solver?		
5.	Do you think working with Ms. Adkins helped get ready for a job?		

Think about every time you've met with CJ:

		Yes	No
6.	Did CJ look like a real friend?		
7.	Did CJ talk like a real friend?		
8.	When you met with CJ, did you feel like you were meeting with a real friend?		
9.	Do you think working with CJ helped you become a better problem solver?		
10.	Do you think working with CJ helped get ready for a job?		

APPENDIX D:
INTERVENTION PEER INTERACTION DIALOGUE GUIDE

Peer Dialogue Guide

5-minute sessions – Only use prompts if participants do not respond independently; always use coaching feedback.

1. Salutation

2. Begin the conversation… e.g., "I heard you have to meet with your boss, we can talk about what happened to help you get ready for your meeting."

3. Ask about the problem, e.g., "What was the problem?"
   Sample Prompt: "I think it was that…"
   Sample Coaching Feedback: "Great, it sounds like you know what the problem was." Or "Remember, your boss will want you to be able to tell her what the problem was."

4. Ask why it's a problem.
   Sample Prompt: "It might be because…"
   Sample Coaching Feedback: "You're right, that's why it was a problem." Or "Make sure you can tell your boss why it was a problem."

5. Request a solution
   Sample Prompt: "Maybe you could offer to…"
   Sample Coaching Feedback: "That's a great solution to the problem." Or "It will help if you can tell your boss what you would do to solve this problem."

6. Ask a question to clarify something the participant said (see questions)
   To prompt suggest the response to your question.
   Sample Coaching Feedback: "Great job answering the question." Or "Your boss will want you to answer questions about what you will do."

Clarifying Questions:

Int. 1	Green card	Scenario 7	What should you do if a customer needs help while you are at work?
Int. 2	Orange card	Scenario 6	What should you do if you don't know how to do a task at work?
Int. 3	Blue card	Scenario 19	What can you do if a customer asks you a question but you don't know the answer?
Int. 4	Yellow card	Scenario 16	What can you say if you think someone is talking about you, or saying something mean?

7. Ask a critical question… e.g., "I am concerned that ___ may not work out, how can you make sure it does?", "What if ___ happens?" (see questions)
   To prompt suggest the response to your question.
   Sample Coaching Feedback: "Great job answering the question." Or "Your boss will want you to answer questions about what you will do."

Critical Questions:

Int. 1	Green card	Scenario 7	What can you do if you don't understand what the customer needs?
Int. 2	Orange card	Scenario 6	What can you do if you still have a hard time with a task after someone has shown you how to do it, because you think it is too hard?
Int. 3	Blue card	Scenario 19	What should you do if a customer gets upset or angry while you are trying to help them?
Int. 4	Yellow card	Scenario 16	What should you do if something someone does is really bothering you, and talking to that person doesn't help?

8. Other prompts **(only use if participant doesn't meet criterion)**:
   - *Make sure you speak up so your boss can hear you/ don't raise your voice.*
   - *Make sure you aren't trying to talk while your boss is talking.*
   - *Look at your boss when she talks to you/ you talk to her.*
   - *Keep your head up/ don't cross your arms while talking to your boss, or she might think you don't want to solve the problem.*

9. Thank the participant for meeting with you today.

APPENDIX E:
IN-FORCE PARTICIPANT QUESTIONAIRE

Participant Code: _____ Date: _____

In-FORCE Participant Demographic Questionnaire

(to be administered in electronic or verbal form)

1. Which of these best describe your current work?

I have a job now, I get paid.	I do volunteer work or have an internship now, I do not get paid.	I had a job before, not now.	I volunteered or had an internship before, not now.	I never did volunteer work, had an internship, or had a job.
☐	☐	☐	☐	☐

2. How many jobs or unpaid positions have you had in your life? _____

3. If you stopped working at your last job, why did you stop?

_____

4. Do you want to have a job in the future?

Yes	No
☐	☐

5. What is your IQ Score? _____

Don't know, or was never tested: ☐

6. What type of high school diploma did (or will) you receive?

Regular Diploma	Special Diploma
☐	☐

7. How old are you? _____

8. What is your gender?

Male	Female
☐	☐

9. What is the yearly income of your whole household?

$50,000 or less	More than $50,000
☐	☐

10. Choose the best answer that describes you:

Do you use the internet almost every day?	Yes ☐	No ☐
Do you have a phone that connects to the internet?	Yes ☐	No ☐
Do you have a Facebook account?	Yes ☐	No ☐
Do you use any other type of social media?	Yes ☐	No ☐

APPENDIX F:
IN-FORCE PROBLEM-SOLVING OBJECTIVE CHECKLIST

Session Code: _____ Rater Code: _____ Session Date: _____ **R1** **R2**

In-FORCE Problem-Solving Checklist

	Criteria: *Did the participant meet each criterion without prompting from the avatar…*	No	Yes
Verbal Objectives	**Restate the problem** Repeat or rephrase the problem identified in the scenario.	☐	☐
	Describe why it is a problem Offer at least one reason or explanation to describe why the problem identified in the scenario would have a negative impact in the workplace.	☐	☐
	Describe a solution Provide at least one reasonable and achievable course of action to address the problem identified in the scenario.	☐	☐
	Answer questions clarifying from supervisor avatar Offer a reasonable response to a question asked by the avatar as a prompt to clarify or restate something the participant said in the session.	☐	☐
	Answer questions critically phrased from supervisor Offer a reasonable response to a question asked by the avatar presented in a manner that challenges something stated by the student.	☐	☐
	Verbal		
Non-verbal Objectives	**Voice control** Maintain intelligible voice volume and dictation during interactions.	☐	☐
	Pause to listen Do not attempt to speak over the avatar.	☐	☐
	Make eye contact when listening At least once during each passage spoken by the avatar.	☐	☐
	Make eye contact when speaking At least once during each passage spoken by the participant.	☐	☐
	Use appropriate body language Maintain open posture with head raised during the majority of the session.	☐	☐
	Non-verbal		
	Total		

Adapted from U.S. Department of Labor (1991)

APPENDIX G:
PERMISSION TO USE PARTNERSHIP FOR 21ST LEARNING MATERIALS

From: **Lizzette Arias** lizzette@p21.org
Subject: Re: Request for Use of P21 Framework
Date: October 8, 2015 at 2:02 PM
To: Caitlyn Bukaty Cbukaty@knights.ucf.edu

Good afternoon Caitlyn,

Thank you for your email. Our materials and educator resources are free for educational purposes. We are happy to grant you permission to use P21 materials, as long as no P21 materials and references are used to imply P21 endorsement. Please see our full terms of use here: http://www.p21.org/our-work/use-of-p21-content

Thank you for citing P21 and linking to our website - www.P21.org.

Please let me know if you have any questions,

Lizzette

Lizzette Arias
Administrative Coordinator
Partnership for 21st Century Learning (P21)
1 Massachusetts Avenue NW, Suite 700
Washington, DC 20001
(202) 750-1362
www.P21.org
Follow us! @P21Learning

On Thu, Oct 8, 2015 at 9:32 AM, Caitlyn Bukaty <Cbukaty@knights.ucf.edu> wrote:

> Good day,
>
> I'm contacting you today to request permission to include P21's Framework for 21st Century Learning in my dissertation. I am a doctoral candidate at the University of Central Florida in Orlando, FL and I wish to refer to the P21 Framework in the development of a study to build workplace problem-solving communication skills for young adults with intellectual disabilities.
>
> If permitted I plan to use the image of the framework from the P21 website, or a version you provide. The content of the Framework will remain unchanged and attribution will be given to P21 and linked to the P21 website. The Framework will be used for educational purposes only and I will not represent myself in a manner that can be interpreted as implying that I am officially certified or endorsed by P21.
>
> My dissertation will be published electronically by the University of Central Florida.
>
> Please do not hesitate to contact me if you have any questions or need any clarification in regard to this request.
>
> Thank you and have a great day,
> Caitlyn Bukaty
>
> Caitlyn A Bukaty MSEd
> Doctoral Candidate
> Presidential Fellow
> Project LEAD Scholar
> University of Central Florida
> College of Education

APPENDIX H:
PERMISSION TO USE TAXONOMY FOR TRANSITION PROGRAMMING 2.0

From: paula.kohler@wmich.edu on behalf of Paula Kohler
To: Caitlyn A. Bukaty
Subject: Re: Taxonomy Figure
Date: Wednesday, April 13, 2016 10:13:55 AM
Attachments: Taxonomy for Transition Programming 2.0 GRAPHIC ONLY March 2016.pdf
Complete Tax Art Working file Sept 2011 P 2 Cats and Sub Cats.pdf

---

Hi - That graphic is pretty dated. You have 2 better choices:

1 - Taxonomy graphic last updated 2011
2 - Taxonomy 2.0, just published

Either would be better than the one you have. You have permission to reprint either of the files attached

Paula

Paula D. Kohler, PhD., Professor and
Associate Vice President for Research
Co-Investigator, National Technical Assistance Center on Transition (NTACT)
Western Michigan University
208W Walwood Hall
Kalamazoo, MI 49008

269.387.8283(direct line)
269.387.6181, Career Connections Research Center (CCRC)
269.387.8264 (fax)

www.wmich.edu/research
http://homepages.wmich.edu/~kohlerp
www.wmich.edu/ccrc
www.transitionta.org

On 4/11/2016 9:52 AM, Caitlyn A. Bukaty wrote:

> Good morning Dr. Kohler,
> May I have permission to include the following figure representing the Taxonomy for Transition Programming. It was taken from the following source, and I will also include the citation.
>
> If there is a different figure you would prefer I use, please let me know.
>
> Thank you!
> Caitlyn
>
> Kohler, P. D. (1996). *Taxonomy for transition programming: Linking research and practice*. University of Illinois at Urbana-Champaign. Transition Research Institute.

APPENDIX I:
UNIVERSITY OF CENTRAL FLORIDA INSTITUTIONAL REVIEW BOARD APPROVAL OF HUMAN RESEARCH

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Caitlyn Bukaty**

Date: **December 01, 2015**

Dear Researcher:

On 12/01/2015, the IRB approved the following human participant research until 11/30/2016 inclusive:

Type of Review:	UCF Initial Review Submission Form
Project Title:	Effects of Mixed-reality Peer Interactions on Workplace Problem-solving of Young Adults with Intellectual Disabilities
Investigator:	Caitlyn Bukaty
IRB Number:	SBE-15-11762
Funding Agency:	
Grant Title:	
Research ID:	N/A

The scientific merit of the research was considered during the IRB review. The Continuing Review Application must be submitted 30days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at https://iris.research.ucf.edu .

If continuing review approval is not granted before the expiration date of 11/30/2016, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

All data, including signed consent forms if applicable, must be retained and secured per protocol for a minimum of five years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained and secured per protocol. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Joanne Muratori

Signature applied by Joanne Muratori on 12/01/2015 04:57:33 PM EST

IRB manager

APPENDIX J:
RECRUITMENT FLYER

Are you an adult, 18 or older
with an intellectual disability?

Build Work Skills

in a research study

Problem Solving with TeachLivE™ Avatars

- Winter 2015/ Spring 2016
- Up to four 30-minute visits to the UCF Teaching Academy

For more information contact:

Caitlyn

(XXX) XXX-XXXX

BuildJobSkills@gmail.com

APPENDIX K:
PARTICPANT CONSENT

A research study to examine the effects of mixed-reality interaction (TLE TeachLivE™) on problem-solving communication for the workplace for young adults with intellectual disabilities.

Informed Consent – Participant

Principal Investigator(s):	Caitlyn A. Bukaty, doctoral candidate
Faculty Supervisor:	Lisa A. Dieker, Ph.D.
Investigational Site(s):	University of Central Florida TLE TeachLivE™ Lab, Teaching Academy - or - A location convenient for the participant

Introduction: Researchers at the University of Central Florida (UCF) study many topics. To do this we need the help of people who agree to take part in a research study. You are being invited to take part in a research study. If you are between the ages of 18 and 25 and have an intellectual disability we would like you to participate in research that will gather information on **practicing workplace problem-solving communication skills**. This study is being conducted to help young adults improve their workplace communication skills for employment.

The person doing this research is Caitlyn A. Bukaty of the Child, Family, and Community Sciences Department in the College of Education and Human Performance. Because the researcher is a graduate student she is being guided by Dr. Lisa A. Dieker, a UCF faculty supervisor in Child, Family, and Community Sciences.

What you should know about a research study:

- Someone will explain this research study to you.
- A research study is something you volunteer for.
- Whether or not you take part is up to you.
- You should take part in this study only because you want to.
- You can choose not to take part in the research study.
- You can agree to take part now and later change your mind.
- Whatever you decide it will not be held against you.
- Feel free to ask all the questions you want before you decide.

Purpose of the Research Study: The purpose of this study is to identify if the treatment of workplace problem-solving communication practice in a mixed-reality learning environment (TLE TeachLivE^{TM}) helps improve workplace problem-solving performance outcomes.

What you will be asked to do in the study: You will be asked to participate in:

- Up to two hours of training including up to six 5-minute meet-and-greet interactions with TeachLivE virtual avatars.
- Up to six 15-minute problem-solving sessions each including one 5-minute interaction with TeachLivE virtual avatars.

Sessions will begin in December 2015 and will be scheduled at times convenient for you.

Each virtual avatar interaction will last **5 minutes** and you will complete **one** during each session. We expect you to spend about 15 minutes in and around the research area for each session.

Before each interaction (except the meet-and-greet sessions during training) you will view or hear about a problem scenario in a workplace. You will have a chance to ask questions about the problem scenario before you begin the interaction. In the interactions you will discuss possible solutions to the problem and meet with a virtual avatar to try to solve the problem.

During the study we will ask you to answer questions about your current and past employment, one time. At the end of the study we will ask you to complete a survey about the study and how you think it will affect your future employment. We will also ask you to provide information including your age, gender, and disability classification.

Location: At the UCF Teaching Academy, on the 2nd floor or another location convenient for you.

Time required: The research sessions will take place from December 2015 to March 2016. Each interaction will take approximately 5 minutes to complete. We expect you to spend about 15 minutes in and around the research area on days you participate in sessions.

Audio or video recording: You will be video recorded during this study. If you do not want to be recorded, you will not be able to participate in the study. Please feel free to discuss this with the researcher or a research team member. The videos will be kept in a locked, safe place. The videos will not be shared with any other sources outside the research team and will be used to establish trends in interview performance. We will be able to share the videos with you at the end of the study if you would like to have access to them. When the study is over the researchers will keep all video files on an external hard drive in a locked cabinet. No one other than members of the research team will have access to these files.

Risks: There are no reasonably foreseeable risks or discomforts involved in taking part in this study.

Benefits: We cannot promise any benefits to you or others from your taking part in this research. However, possible benefits include improving your workplace communication and problem-solving skills in preparation for employment. The intervention studied in this research study will consist of practice communication and problem-solving with professional actors and avatars.

Compensation or payment: There is no compensation or other payment to you for taking part in this study.

Confidentiality: We will limit your personal data collected in this study to people who have a need to review this information. We cannot promise complete secrecy. Organizations that may inspect and copy your information include the IRB and other representatives of UCF.

Study contact for questions about the study or to report a problem: If you have any questions or comments about your selection or treatment as a research participant or if you would like to obtain a hard copy of this Informed Consent document, please contact:

Caitlyn Bukaty
University of Central Florida College of Education
4000 Central Florida Blvd.
Orlando, FL 32816-1250
(XXX) XXX-XXXX

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901. You may also talk to them for any of the following:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You want to get information or provide input about this research.

Withdrawing from the study: If you decide to leave the study, contact the investigator so that the investigator can make appropriate plans and revisions to the research design. We will tell you about any new information that may affect your health, welfare or choice to stay in the research.

APPENDIX L:
PARENT/ GUARDIAN CONSENT FOR NON-GUARDIAN PARTICIPANTS AGE 18 AND OLDER

A research study to examine the effects of mixed-reality interaction (TLE TeachLivE^{TM}) on problem-solving communication for the workplace for young adults with intellectual disabilities.

Informed Consent – Parent/ Guardian Version

Principal Investigator(s):	Caitlyn A. Bukaty, doctoral candidate
Faculty Supervisor:	Lisa A. Dieker, Ph.D.
Investigational Site(s):	University of Central Florida TLE TeachLivE^{TM} Lab, Teaching Academy - or - A location convenient for the participant

Introduction: Researchers at the University of Central Florida (UCF) study many topics. To do this we need the help of people who agree to take part in a research study. Your young adult is being invited to take part in a research study. If your young adult is between the ages of 18 and 25 and has an intellectual disability, we would like him or her to participate in research that will gather information on the effectiveness of **practicing workplace problem-solving communication skills**. This study is being conducted to help young adults improve their workplace communication skills in preparation for employment.

The person doing this research is Caitlyn A. Bukaty of the Child, Family, and Community Sciences Department in the College of Education and Human Performance. Because the researcher is a graduate student she is being guided by Dr. Lisa A. Dieker, a UCF faculty supervisor in Child, Family, and Community Sciences.

What you should know about a research study:

- Someone will explain this research study to you and your young adult.
- A research study is something you volunteer for.
- Whether or not your young adult takes part is up to you and your young adult.
- Your young adult should take part in this study only because you both agree to it.
- You can choose for your young adult not to take part in the research study.
- You can agree for your young adult to take part now and later change your mind.
- Whatever you decide it will not be held against you or your young adult.

- Feel free to ask all the questions you want before you decide.

Purpose of the Research Study: The purpose of this study is to identify if the treatment of workplace problem-solving communication practice in a mixed-reality learning environment (TLE TeachLivE^{TM}) helps improve workplace problem-solving performance outcomes.

What your young adult will be asked to do in the study: Your young adult will be asked to participate in:

- Up to two hours of training including up to six 5-minute meet-and-greet interactions with TeachLivE virtual avatars.
- Up to six 15-minute problem-solving sessions each including one 5-minute interaction with TeachLivE virtual avatars.

Sessions will begin in December 2015 and will be scheduled at times convenient for you and your young adult.

Each virtual avatar interaction will last **5 minutes** and your young adult will **one** during each session. We expect participants to spend about 30 minutes in and around the research area for each session.

Before each interaction (except the meet-and-greet sessions during training) your young adult will view or hear about a problem scenario in a workplace. Your young adult will have a chance to ask questions about the problem scenario before he or she begins the interaction. In the interactions your young adult will discuss possible solutions to the problem and meet with a virtual avatar to try to solve the problem.

During the study we will ask your young adult to answer questions about his or her current and past employment, one time. At the end of the study we will ask your young adult to complete a survey about the study and how he or she thinks it will affect his or her future employment. We will also ask your young adult to provide information including his or her age, gender, and disability classification.

Location: At the UCF Teaching Academy, on the 2nd floor or another location convenient for you and your young adult.

Time required: The research sessions will take place from December 2015 to March 2016. Each interaction will take approximately 5 minutes to complete. We expect your young adult to spend about 15 minutes in and around the research area on days he or she participates in sessions.

Audio or video recording: Your young adult will be video recorded during this study. If you do not want your young adult to be recorded, he or she will not be able to participate in the study. Please feel free to discuss this with the researcher or a research team member. The videos will be kept in a locked, safe place. The videos will not be shared with any other sources outside the research team and will be used to establish trends in performance. We will be able to share the videos with you and your young adult at the end of the study if you would like to have access to them. When the study is over the researchers will keep all video files on an external hard drive in a locked cabinet. No one other than members of the research team will have access to these files.

Risks: There are no reasonably foreseeable risks or discomforts involved in taking part in this study.

Benefits: We cannot promise any benefits to your young adult or others from your taking part in this research. However, possible benefits include improving workplace communication and problem-solving skills in preparation for employment. The intervention studied in this research study will consist of practice communication and problem-solving with avatars.

Compensation or payment: There is no compensation or other payment to you or your young adult for taking part in this study.

Confidentiality: We will limit personal data collected in this study to people who have a need to review this information. We cannot promise complete secrecy. Organizations that may inspect and copy your information include the IRB and other representatives of UCF.

Study contact for questions about the study or to report a problem: If you have any questions or comments about your young adult's selection or treatment as a research participant or if you would like to obtain a hard copy of this Informed Consent document, please contact:

Caitlyn Bukaty
University of Central Florida College of Education
4000 Central Florida Blvd.
Orlando, FL 32816-1250
(XXX) XXX-XXXX

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901. You may also talk to them for any of the following:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You want to get information or provide input about this research.

Withdrawing from the study: If your young adult decides to leave the study, contact the investigator so that the investigator can make appropriate plans and revisions to the research design. We will tell you about any new information that may affect your young adult's health, welfare or choice to stay in the research.

You have received **2** copies of this form. If you would like your young adult to participate please sign one form and return it to the researcher. Keep the other form for your records.

DO NOT SIGN THIS FORM AFTER THE IRB EXPIRATION DATE BELOW

_____
Name of child participant

_____
Signature of parent or guardian*

_____
Printed name of parent or guardian*

_____
Date

* Note on permission by guardians: An individual may provide permission for a child only if that individual can provide a written document indicating that he or she is legally authorized to consent to the child's general medical care. Attach the documentation to the signed document.

APPENDIX M:
PARTICIPANT ASSENT FOR NON-GUARDIAN PARTICIPANTS AND MINOR PARTICIPANTS

In-FORCE Assent Form – Participant Version

Caitlyn Bukaty and Lisa Dieker want you to be part of a research study at the University of Central Florida.
We hope to help you improve your workplace communication skills.

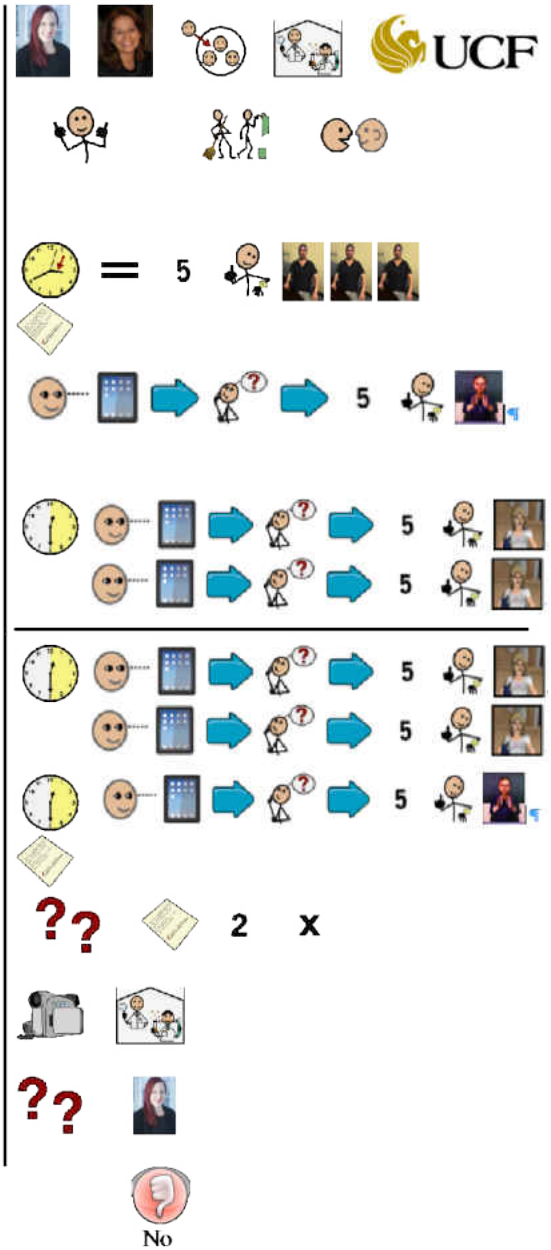
What you will be asked to do in the study:

- **One hour of training and pre-test, one time** including up to three 5 minute meet-and-greet interactions with a TeachLivE virtual avatar, a test, and one 5 minute problem-solving session with a supervisor avatar.
- **Up to two, 30 minute sessions two times** each including two 5 minute interactions with a TeachLivE peer virtual avatar.
- **One 30 minute post-test, one time** including one 5 minute problem-solving session with a supervisor avatar and the final survey.

We will ask you to answer questions on a survey two times during the study.

You will be video recorded during this study.

If you have any questions, please contact Caitlyn Bukaty



Would you like to participate? Yes No

Name Date

APPENDIX N:
PARENT/ GUARDIAN CONSENT FOR MINOR PARTICIPANTS

A research study to examine the effects of mixed-reality interaction (TLE TeachLivE™) on problem-solving communication for the workplace for young adults with intellectual disabilities.

Informed Consent – Parent/ Guardian of Minor Version

Principal Investigator(s):	Caitlyn A. Bukaty, doctoral candidate
Faculty Supervisor:	Lisa A. Dieker, Ph.D.
Investigational Site(s):	University of Central Florida TLE TeachLivE™ Lab, Teaching Academy - or - A location convenient for the participant

Introduction: Researchers at the University of Central Florida (UCF) study many topics. To do this we need the help of people who agree to take part in a research study. Your young adult is being invited to take part in a research study. If your young adult has an intellectual disability, we would like him or her to participate in research that will gather information on the effectiveness of **practicing workplace problem-solving communication skills**. This study is being conducted to help young adults improve their workplace communication skills in preparation for employment.

The person doing this research is Caitlyn A. Bukaty of the Child, Family, and Community Sciences Department in the College of Education and Human Performance. Because the researcher is a graduate student she is being guided by Dr. Lisa A. Dieker, a UCF faculty supervisor in Child, Family, and Community Sciences.

What you should know about a research study:

- Someone will explain this research study to you and your young adult.
- A research study is something you volunteer for.
- Whether or not your young adult takes part is up to you and your young adult.
- Your young adult should take part in this study only because you both agree to it.
- You can choose for your young adult not to take part in the research study.
- You can agree for your young adult to take part now and later change your mind.
- Whatever you decide it will not be held against you or your young adult.
- Feel free to ask all the questions you want before you decide.

Purpose of the Research Study: The purpose of this study is to identify if the treatment of workplace problem-solving communication practice in a mixed-reality learning environment (TLE TeachLivE^{TM}) helps improve workplace problem-solving performance outcomes.

What your young adult will be asked to do in the study: This study will have a treatment group and a control group; that means that not every participant will have the same experience. Your young adult will be assigned to one of these groups after his or her first research session. To make the assignments random we will use a coin flip, to make the treatment and control groups as comparable as possible we will use the information we learn in the first session.

If your young adult is assigned to the control group he or she will be asked to participate in:

- One 1-hour session including a training video, up to three 5-minute meet-and-greet interactions with TeachLivE virtual avatars, and a transition survey.
- One 30-minute problem-solving session including one 5-minute interaction with a TeachLivE virtual avatar and a final survey about his or her experience.

If your young adult is assigned to the treatment group he or she will be asked to participate in:

- All the activities described above, and
- Two 30-minute problem-solving sessions, each including two 5-minute interactions with a TeachLivE virtual avatar.

Sessions will begin in December 2015 and will be scheduled at times convenient for you and your young adult.

Each virtual avatar interaction will last **5 minutes** and your young adult will participate in **one to three** during each session. We expect participants to spend about 30 to 60 minutes in and around the research area for each session.

Before each interaction (except the meet-and-greet sessions during training) your young adult will view or hear about a problem scenario in a workplace. Your young adult will have a chance to ask questions about the problem scenario before he or she begins the interaction. In the interactions your young adult will discuss possible solutions to the problem and meet with a virtual avatar to try to solve the problem.

During the study we will ask your young adult to answer questions about his or her current and past employment, one time. At the end of the study we will ask your young adult to complete a survey about the study and how he or she thinks it will affect his or her future employment. We will also ask your young adult to provide information including his or her age, gender, and disability classification.

Location: At the UCF Teaching Academy, on the 2nd floor or another location convenient for you and your young adult.

Time required: The research sessions will take place from December 2015 to March 2016. Each interaction will take approximately 5 minutes to complete. We expect your young adult to spend about 15 minutes in and around the research area on days he or she participates in sessions.

Audio or video recording: Your young adult will be video recorded during this study. If you do not want your young adult to be recorded, he or she will not be able to participate in the study. Please feel free to discuss this with the researcher or a research team member. The videos will be kept in a locked, safe place. The videos will not be shared with any other sources outside the research team and will be used to establish trends in performance. We will be able to share the videos with you and your young adult at the end of the study if you would like to have access to them. When the study is over the researchers will keep all video files on an external hard drive in a locked cabinet. No one other than members of the research team will have access to these files.

Risks: There are no reasonably foreseeable risks or discomforts involved in taking part in this study.

Benefits: We cannot promise any benefits to your young adult or others from your taking part in this research. However, possible benefits include improving workplace communication and problem-solving skills in preparation for employment. The intervention studied in this research study will consist of practice communication and problem-solving with avatars.

Compensation or payment: There is no compensation or other payment to you or your young adult for taking part in this study.

Confidentiality: We will limit personal data collected in this study to people who have a need to review this information. We cannot promise complete secrecy. Organizations that may inspect and copy your information include the IRB and other representatives of UCF.

Study contact for questions about the study or to report a problem: If you have any questions or comments about your young adult's selection or treatment as a research participant or if you would like to obtain a hard copy of this Informed Consent document, please contact:

Caitlyn Bukaty
University of Central Florida College of Education
4000 Central Florida Blvd.
Orlando, FL 32816-1250
(XXX) XXX-XXXX

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901. You may also talk to them for any of the following:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You want to get information or provide input about this research.

Withdrawing from the study: If your young adult decides to leave the study, contact the investigator so that the investigator can make appropriate plans and revisions to the research design. We will tell you about any new information that may affect your young adult's health, welfare or choice to stay in the research.

You have received **2** copies of this form. If you would like your young adult to participate please sign one form and return it to the researcher. Keep the other form for your records.

DO NOT SIGN THIS FORM AFTER THE IRB EXPIRATION DATE BELOW

_____
Name of child participant

_____
Signature of parent or guardian*

_____
Printed name of parent or guardian*

_____
Date

* Note on permission by guardians: An individual may provide permission for a child only if that individual can provide a written document indicating that he or she is legally authorized to consent to the child's general medical care. Attach the documentation to the signed document.

APPENDIX O:
TRAINING CHECKLIST FOR PARTICIPANT ACHIEVEMENT

Participant Code:_____ Rater Initials: ____ Session Date: _____ **R1** **R2**

- ☐ Make eye contact with the avatar
- ☐ Visually attend to the avatar's speech and actions
- ☐ Respond to a question posed by the avatar
- ☐ Ask a question of, or initiate discussion with the avatar

APPENDIX P:
STUDY TIMELINE

	Aug 15	Sep 15	Oct 16	Nov 16	Dec 16	Jan 15	Feb 16	Mar 16	Apr 16	May 16	Jun 16	Jul 16	Aug 17
Contact organizations and school districts for interest in recruitment support/ participation													
Complete Chapters 1, 2, and 3													
Draft IRB and Research Request													
Proposal to Committee													
Defend proposal													
Update IRB and Research Request													
Anticipated IRB approval													
Recruitment													
Group assignments, participant contact, and scheduling													
Research sessions (training, pre-test, intervention for treatment group, post-test)													
Data analysis													
Completion of Chapters 4 and 5 (updates to 2, 3, and 1 as needed)													
Dissertation to committee													
Defend Dissertation													
Revisions and final submission													
Commencement													

APPENDIX Q:
TEXT COPIES OF PROBLEM-SOLVING SCENARIOS

Scenario 3:
You work at a library with two other people. Your boss asked the three of you to work on a project together. You tried to work with your co-workers but it was hard to find time to work together. You did the whole project by yourself.

Your boss said:
"I'm glad that this project is done, but it looks like you did the whole thing yourself. You did not work with your co-workers as a team. That's what I asked you to do. It's important that you can be part of a team at work. We need to have a meeting to talk about this."

What can you say to your boss at the meeting to work out this problem?

Let's review:

- Your boss asked you and two co-workers to do a project together.
- You tried to work with them, but it did not work out.
- You ended up doing everything yourself.
- Your boss was not happy, because she wanted you to work as a team.

Video:
https://youtu.be/JkoucVq2ov0

Scenario 5:
Your boss gave you some papers to file near the end of the day yesterday. You looked at the papers but you didn't know where to file them. You went to look for your boss but she was not at her desk. At the end of the day you left them on your desk. Today your boss saw them sitting there.

She said:
"I asked you to file those papers yesterday. You did not finish the job, and you left those papers sitting out. The papers are important. You can't leave things like that lying around. They could get lost. We need to have a meeting to review what I expect you to do with the papers."

What can you say to your boss at the meeting to work out this problem?

Let's review:

- You had papers to file.
- You did not know where to put them.
- You left them lying out.
- Your boss was worried because the papers could have gotten lost.

Video:
https://youtu.be/fMjebRca4Cc

Scenario 6:
You work at a store. Yesterday your boss asked you to fill the cash register drawers with money for the day. This was your first time doing that task and you did not know what to do. You put some of each kind of bill and coin in each drawer.

Today your boss said:
"Last night the amount of money in the register drawers was wrong. You filled those drawers yesterday morning. They were wrong and it took longer to count them out last night. We could have lost money without even knowing it. We need to meet and talk about what happened and how we can make sure it does not happen again."

What can you say to your boss at the meeting to work out this problem?

Let's review:

- You were asked to fill the cash registers at work.
- You had never done that job before and did not know how.
- You tried your best, but the drawers were filled wrong.
- Your boss was not happy, because the mistake made more work for other people, and money could have been lost.

Video:
https://youtu.be/ElGnlsWaEyc

Scenario 7:
You work at a grocery store putting food into the freezer. Today a customer asked you to help him find cereal. You were busy putting food into the freezer, so you told the customer you couldn't help him. He was not happy, and he told your boss you would not help.

Your boss said:
"Today you told a customer that you could not help him. When you work at this store, it is your job to help anyone who asks for help. We need to meet to talk about how you can be more helpful to customers."

What can you say to your boss at the meeting to work out this problem?

Let's review:

- A customer at the grocery store where you work asked you for help.
- You were busy and told him you could not help.
- The customer was mad.
- Your boss was not happy, because you did not help a customer who asked for help.

Video:
https://youtu.be/K9qjHYds1Lc

Scenario 16:
When you came in to work this morning your boss and your co-worker were talking in the hall. When you walked up they stopped talking. You thought they were talking about you. You asked if they were, and they said no. You told them you did not believe them. Your co-worker walked away, and your boss stayed in the hall with you.

She said:
"I'm sorry you thought we were talking about you. We were not. Just because we stopped talking does not mean it was about you. Your co-worker may have been telling me something private that she did not want other people to hear. It is important that you feel comfortable at work and not worried about people talking about you. Let's meet and talk about what you can do if you feel that way again."

What can you say to your boss at the meeting to work out this problem?

Let's review:

- You thought your boss and a co-worker were talking about you.
- They said they were not.
- You did not believe them.
- Your boss was worried, because she does not want you to feel uncomfortable around your co-workers.

Video:
https://youtu.be/PyoSAHdfeBo

Scenario 19:
You work at a store. Yesterday a customer came to you and asked where he could make a return. You did not know how returns worked, so you told the customer there was no way to do that. The customer yelled at you and asked to talk to your boss. After your boss helped the customer she came to find you.

She said:
"You did not help that customer return his item. If you don't know how to help someone in the store, you should find someone who does. Customers can be rude sometimes, but we have to make sure we always treat them nicely. Let's meet to talk about what happened, and how you can help customers in the future."

What can you say to your boss at the meeting to work out this problem?

Let's review:

- A customer at the store where you work wanted to make a return.
- You did not know how to help with a return.
- You told the customer returns could not be done, and the customer was mad.
- Your boss was not happy, because you did not help the customer.

Video:
https://youtu.be/2B0mJjQWVrQ

APPENDIX R:
TRAINING SESSION RESEARCHER AND VIDEO SCRIPT

Training Session Script

Researcher:
"Hi and thanks for coming to UCF today to work on our project. My name is Caitlyn and I'm leading this project, feel free to ask me questions at any time.

Before we get started I want to make sure you know where we are. This is the UCF Teaching Academy. Each time you come for this project you will come to this building and me, or one of my assistants around this room (refer to research lab).

There are some chairs in this hallway if you want to sit down while you are waiting. The bathrooms are right here if you need them (refer to restrooms) and there are vending machines on the first floor (refer to vending machine area) if you need anything from there.

I have a video to explain this project to you."

(*Play Training Video, Part I*) – includes concept of role play and concept of avatar.
https://youtu.be/U75q9RQzlFY

Video I Script:

Welcome to UCF and thank you for being a part of the In-FORCE project. My name is Caitlyn and I created this project. Please feel free to ask me any questions you have, at any time.

In-FORCE has been created to help you practice skills that you will need at work.

You are going to practice these skills using something called "role play".

Role play is when you think about something that did not really happen, but could happen. Each time you come you will hear stories about problems at work – we know these things did not really happen, but they could, so we will ask you to talk about them practice for the future.
If you have any questions about role play, feel free to ask me, or anyone else working on this project.

When you talk about the problems for the In-FORCE Project, you will be meeting with avatars. Avatars are virtual people you will see on a screen. Avatars are not real people, but they look and act like real people. Talking with them will help you practice for the future, when you have to talk to people at work.

First you will meet Ms. Adkins. You will not have a problem to talk about with Ms. Adkins right now. You will just practice what it is like to talk to an avatar.

After video…

Researcher:
"Do you have any questions for me?" (Answer questions as needed.)

"Now we're going to have a chance for you to meet an avatar. We just want you to meet this avatar for practice. Her name is Ms. Adkins."

(*Initiate meet-and-greet session with Ms. Adkins*)

After meet-and-greet…

Researcher:
"Now that you've had a chance to meet an avatar let's learn a little more about what we'll be doing in the next session."

(*Play Training Video, Part II*) – includes sample scenario and introduction to Ms. Adkins as supervisor.
https://youtu.be/3wEllqTy1Yg

Video II Script:

Hi again! Now that you have had a chance to talk to an avatar you are going to have a chance to see one of the problem videos like the ones you will use next time you talk to an avatar. Remember, this is not something that really happened, we made it up, but it is something that could happen at work. Right now you are only going to watch this video to see to what it is like, you will not be asked to talk about this story.

(Video proceeds to Scenario 1)

You got a new cell phone for your job. Your boss told you it was for customers and co-workers to call you for work tasks during the day. She told you to turn it on at the beginning of the day and turn it off when work is over. You notice that the phone also sends text messages. To practice you send your friend a message saying "Hi." Your boss found out that you texted a friend from your work phone.
She said:
"I saw that you sent a text to someone on your work phone. That phone is only for work. Adding other numbers means you might send something from work to a person who is not part of our work. We need to meet to talk about your work phone, and what you should do with it."
What can you say to your boss at the meeting to work out this problem?

Now that you had a chance to see the problem video, you're just about ready to get started.

The avatar you saw in the video was Ms. Adkins. For this project you will meet with Ms. Adkins, and she will play to role of your boss at work. Remember, we know she is not

really your boss, but we are going to pretend that she is your boss so that you can practice talking to your boss about a problem at work.

If you have any questions about anything that happens in this project please feel free to ask.

After video….

Researcher:
"Do you have any questions for me?" (Answer questions as needed.)

APPENDIX S:
TRAINING SESSION DIALOGUE GUIDE

Training Dialogue Guide

1. Greet the participant.
2. Introduce yourself.
3. Ask participant questions about himself or herself.
4. Encourage the participant to ask you questions.
5. Thank the participant for taking time to talk to you today.

APPENDIX T:
RESEARCH SESSION INTRODUCTION SCRIPTS

Pre-Test Researcher Script
Researcher:
"Now we're going to try out our first problem video. Remember this is role play; that means it did not really happen. This is something we made up to talk about with the avatar, but this is something that could happen in real life at work."

(*Show Scenario 5, pause after "What can you say to you boss at the meeting to work out this problem?"*)

Ask – "Do you have any questions about the video?" (Answer any questions about video content; do not provide solutions.)

(Show "Let's Review" portion)

After video…

Ask – "Do you have any questions about the video now?" (Answer any questions about video content; do not provide solutions.)

"Now it's time to meet with Ms. Adkins about this problem, we're going to pretend she's your boss at work. Remember this did not really happen, we made this up for you to talk about with Ms. Adkins, but it is something that could happen in real life at work."

Post-Test Researcher Script
Researcher:
"We're going to talk about one more problem with Ms. Adkins. Remember this is role play; that means it did not really happen. This is something we made up to talk about with the avatar, but this is something that could happen in real life at work."

(*Show Scenario 3, pause after "What can you say to you boss at the meeting to work out this problem?"*)

Ask – "Do you have any questions about the video?" (Answer any questions about video content; do not provide solutions.)

(Show "Let's Review" portion)

After video…

Ask – "Do you have any questions about the video now?" (Answer any questions about video content; do not provide solutions.)

"Now it's time to meet with Ms. Adkins about this problem, we're going to pretend she's your boss at work. Remember this did not really happen, we made this up for you to talk about with Ms. Adkins, but it is something that could happen in real life at work."

Intervention Session 1 Researcher Script
Researcher:
"Today we're going to try something different. You are going to learn about a problem, but this time you are going to talk about it with an avatar who is playing your friend, C.J.

(Show picture of C.J. as introduction.)

You and C.J. will work together to solve the problem. Remember this is role play; that means it did not really happen. This is something we made up to talk about with the avatar, but this is something that could happen in real life at work."

(*Show Scenario 7, pause after "What can you say to you boss at the meeting to work out this problem?"*)

Ask – "Do you have any questions about the video?" (Answer any questions about video content; do not provide solutions.)

(Show "Let's Review" portion)

After video…

Ask – "Do you have any questions about the video now?" (Answer any questions about video content; do not provide solutions.)

"Now it's time to meet with C.J. to work on this problem, we're going to pretend she's your friend at work. Remember this did not really happen, we made this up for you to talk about with C.J., but it is something that could happen in real life at work."

Intervention Session 2 Researcher Script
Researcher:
"Now we're going to talk about another problem with C.J. Remember, C.J. is playing your friend at work. You and C.J. will work together to solve the problem. Remember this is role play; that means it did not really happen. This is something we made up to talk about with the avatar, but this is something that could happen in real life at work."

(*Show Scenario 6, pause after "What can you say to you boss at the meeting to work out this problem?"*)

Ask – "Do you have any questions about the video?" (Answer any questions about video content; do not provide solutions.)

(Show "Let's Review" portion)

After video…

Ask – "Do you have any questions about the video now?" (Answer any questions about video content; do not provide solutions.)

"Now it's time to meet with C.J. to work on this problem, we're going to pretend she's your friend at work. Remember this did not really happen, we made this up for you to talk about with C.J., but it is something that could happen in real life at work."

Intervention Session 3 Researcher Script

Researcher:
"Now we're going to talk about another problem with C.J. Remember, C.J. is playing your friend at work. You and C.J. will work together to solve the problem. Remember this is role play; that means it did not really happen. This is something we made up to talk about with the avatar, but this is something that could happen in real life at work."

(*Show Scenario 19, pause after "What can you say to you boss at the meeting to work out this problem?"*)

Ask – "Do you have any questions about the video?" (Answer any questions about video content; do not provide solutions.)

(Show "Let's Review" portion)

After video…

Ask – "Do you have any questions about the video now?" (Answer any questions about video content; do not provide solutions.)

"Now it's time to meet with C.J. to work on this problem, we're going to pretend she's your friend at work. Remember this did not really happen, we made this up for you to talk about with C.J., but it is something that could happen in real life at work."

Intervention Session 4 Researcher Script

Researcher:
"Now we're going to talk about one more problem with C.J. Remember, C.J. is playing your friend at work. You and C.J. will work together to solve the problem. Remember this is role play; that means it did not really happen. This is something we made up to talk about with the avatar, but this is something that could happen in real life at work."

(*Show Scenario 16, pause after "What can you say to you boss at the meeting to work out this problem?"*)

Ask – "Do you have any questions about the video?" (Answer any questions about video content; do not provide solutions.)

(Show "Let's Review" portion)

After video…

Ask – "Do you have any questions about the video now?" (Answer any questions about video content; do not provide solutions.)

"Now it's time to meet with C.J. to work on this problem, we're going to pretend she's your friend at work. Remember this did not really happen, we made this up for you to talk about with C.J., but it is something that could happen in real life at work."

APPENDIX U:
TRAINING INTERACTION FIDELITY CHECKLIST

Video File Code: _____ Rater Initials: _____ **R1** **R2**

Check for "YES"

Did the participant have the opportunity to complete the following task?

In-FORCE Training Fidelity of Implementation Checklist

☐ Make eye contact with the avatar

☐ Visually attend to the avatar's speech and actions

☐ Respond to a question posed by the avatar

☐ Ask a question of, or initiate discussion with the avatar

APPENDIX V:
AVATAR INTERACTION FIDELITY CHECKLIST

Rater Initials: ____ Session Code: _____ R1 R2

In- FORCE Session Fidelity Check

Please note the completion of each of these items, giving the participant an opportunity to meet each criterion in the *In-FORCE Problem-Solving Checklist.*

		1- YES 0 – NO	COMMENTS
1	Did the participant watch the video before this session?		
2	Ask what the problem was		
	If intervention: Peer Coaching		
3	Ask why it was a problem		
	If intervention: Peer Coaching		
4	Request a solution		
	If intervention: Peer Coaching		
5	Ask a clarifying question		
	If intervention: Peer Coaching		
6	Ask a critical question		
	If intervention: Peer Coaching		
	Other prompts **(for use only if participant doesn't meet criterion)**		*(if not needed write "N/A" below)*
7	*Voice control*		
8	*Pause to listen/ don't talk over*		
9	*Eye contact when speaking*		
10	*Eye contact when listening*		
11	*Body Language*		
	Total		

APPENDIX W:
TRAINING SESSION FIDELITY CHECKLIST

Date: _____ **Observer Initials: _____**

In-FORCE Training Session Protocol

Please note completion status of each activity:

Activity	Details	Status 1-Yes, 0-N0
Review Concept of Role Play	Video overview with participants	
Introduce Concept of Virtual Avatar	Show picture of avatar for training, with name, as group	
Training w/ virtual avatar	Individual sessions with participants, training checklist completed	
View Sample Scenario	View one scenario video not to be used for research sessions, on iPad, using speaker for sound, opportunity to ask questions about scenario, or scenario viewing in general	
Review Session Schedule	Visual depiction of session components, "video then meeting."	
View Waiting Area, Research Room, and other building features	Orient participants to building. Where to meet, where to wait, restrooms, research room.	

APPENDIX X:
PROMPT DEFINITION

What is a Prompt?

Prompt – an instance when the avatar provides information to the participant that directly assists them in meet a criterion.

Examples	Non-Examples
I think the problem was…	*Questions only asking the participant to fulfill a criterion:*
That might be a problem because…	What was the problem?
Maybe you could solve it by…	Why is that a problem?
When you're talking make sure you speak loud enough/ clearly.	How could you solve it?
Make sure you look at the person you're talking to/ who's talking to you.	*Affirmations:*
Make sure you keep your head up/ don't cross your arms.	Good idea!
	Good job making eye contact.

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