**A review of interview preparation via virtual and mixed reality for individuals with intellectual and developmental disorder**

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**Abstract.**

**BACKGROUND:** There is substantial evidence that a lack of social skills and social competence is the primary barrier to gaining and maintaining employment for individuals with IDD. Data on employment outcomes along with scholarly literature on social skills education provide evidence that current programming is unsuccessful for individuals with IDD transitioning into the workplace.

**OBJECTIVE:** This literature review provides a broad overview of innovative media and technology offering educators novel practices and strategies to improve interview performance and employment preparation for individuals with intellectual and developmental disorder (IDD).

**RESULTS:** The literature shows that multiple currently available technologies, including virtual reality and mixed reality, can improve the social skills required for successful interpersonal interactions and interviewing in individuals with IDD.

**CONCLUSIONS:** Transition educators should be encouraged to consider how innovative technologies can be used to support the development of social skills for students with IDD in employment preparation.

Keywords: Interviewing, technology, employment, virtual reality, social skills, intellectual disability

## 1. Background

### *1.1. Intellectual and developmental disorder and employment*

Intellectual and developmental disorder (IDD) is often referred to as intellectual disability, and can be summarized as significantly sub-average general intellectual functioning, existing concurrently with deficits in adaptive behavior and manifesting during the developmental period, that adversely affects a child's educational performance (American Psychiatric Association, n.d.). One of the major challenges for individuals with IDD is employment. Although entry into the world of work is a marker of post-school success in the United States, students with IDD often leave high school without the skills, experiences, and support that lead to meaningful employment (Carter, Austin, & Trainor, 2012). Employment is also a major aspect of social integration into the community (Ju, Zhang, & Pacha, 2012) and provides opportunities for personal fulfilment, bestows both public and individual identity, and lends structure to everyday life (Lent & Brown, 2013).

Although employment is an important factor in overall quality of life, most individuals with IDD struggle to find jobs after completing secondary schooling and many begin a lifetime of being unemployed or underemployed. The United States Department of Labor (U.S. DOL) reports that 43% of 20-24 year olds with disabilities are employed, as compared to 72% of neurotypical persons in the same age group (U.S. DOL, Bureau of Labor Statistics, 2017). Livermore and Goodman (2009) note that individuals with IDD experience deficits in job-related skills, including communication and social problem solving, which become problematic when

they attempt to gain and sustain employment. Social problem solving is a component of adaptive behavior, an area in which individuals with IDD are often limited (Bertelli, Munir, Harris, & Salvador-Carulla, 2016). The purpose of this paper is to provide transition educators with ideas to address these skill deficits through the use of comprehensive and innovative teaching methods. This paper will offer a cohesive review of progress being made with regard to the use of technology in employment preparation for individuals with IDD and discuss specific strategies. Thus, while the findings from many relevant studies are discussed, this paper is not intended to be a comprehensive review of all the extant literature in the field.

### *1.2. Technology and education*

The integration of technology and academics is increasingly important for academic persistence and success (Getzel & Thoma, 2008), and academic instruction includes workplace and employment coaching. Technology-based learning and assessment systems are pivotal to improving student learning and generating data that can be used to continuously improve the education system at all levels (United States Department of Education [U.S. ED], Office of Educational Technology [OET], 2017). Technological tools can also empower adolescents transitioning into young adulthood. The United States' National Education Technology Plan (NETP) calls for states, districts, and schools to develop and implement learning resources that exploit the flexibility and power of technology to reach all learners anytime and anywhere (U.S. ED, OET, 2017). These learning resources will help to achieve the NETP's goal of all learners

having “engaging and empowering learning experiences in both formal and informal settings that prepare them to be active, creative, knowledgeable, and ethical participants” (U.S. ED, OET, 2017, p. 9) in a globally networked society. Technology has tremendous power to engage young people, and it is important that educators use technology to educate all learners. Advances in technology, especially those that infuse technology into academic support and interventions for students with disabilities, may benefit learners who struggle with environments not designed to meet their learning needs and styles (Fitzgerald, Koury, & Mitchem, 2008). Social skills development and preparation for employment, including job interviews, are one area where technology may be able to assist individuals in specific settings.

## 2. Social skills and IDD

### *2.1. Social skills training*

Collaborative skills and the ability to socialize have been identified as important competencies for students to gain employment (Balestreri, Sambolt, Duhon, Smerdon, & Harris, 2014). These skills are specific measurable interpersonal behaviors, such as establishing eye contact, smiling, or taking turns, that increase the probability of obtaining positive reinforcement or minimize the likelihood of negative reinforcement (Blaszczynski & Green, 2012). Proper social abilities, in addition to other factors, can lead to enhanced social inclusion and better outcomes both in and out of work settings (Lecavalier & Butter, 2010). According to Ju et al. (2012), social skills are highly valued by employers in the service/business industry–indeed, they

found that employers "value personal attributes and nonspecific job skills over technical skills… [and that] prevocational and vocational training curricula should emphasize positive work attitudes, habits, and social skills" (p. 36). Tribble (2009) writes that "the skills most demanded by today's employers are soft skills" (p. 23). However, soft skills are more difficult to measure and teach than technical skills (Loughry, Ohland, & Woehr, 2014).

In order to improve the social interactions of individuals with IDD**,** Johnson, Douglas, Bigby, and Iacono (2010) suggested that educators and service providers "take a more direct role in practicing person-centered approaches to promote relationship building" (p. 185). Person-centered approaches have been found to "have a significant increase … on personal outcomes" (Gosse, Griffiths, Owen, & Feldman, 2017, p. 203) for individuals with IDD, including outcomes like participating in the community to a greater degree and being able to "perform different social roles" (p. 202). Similarly, a meta-analysis conducted by Park, Kim, and Kim in 2016 concluded that social skills training had a medium positive effect size for secondary students with IDD. Thus, since the value of effective social skills and social awareness for those with IDD cannot be overstated, person-centered social skills training is an integral part of interview skill development.

### *2.2. Interviewing*

Interviews are a unique type of social interaction. In a typical interview, there are intricate environmental cues that individuals with IDD generally struggle with as they lack the

ability to respond and modify their behavior based on cues provided (Carr, Linehan, O'Reilly, Walsh, & McEvoy, 2016). In addition to behavior self-modification, self-advocacy and social competence are vital during the interview process as the interviewee tries to "sell oneself" in order to gain employment (Ellis, West, Ryan, & DeShon, 2002; Peeters & Lievens, 2006; Rosenfeld, 1997). The ability of the candidate to highlight personal skills (e.g. openness, flexibility, willingness to take risks) is desired by employers, particularly for individuals who may have very limited–or no–previous job experience. As noted by Crites and Dunn in their 2004 study, individuals with IDD often need additional help developing this skill.

Individuals with IDD also need further instruction in the ability to engage in small talk. Often, interviewers rely on the small talk that occurs before and between questions to get a "feel" for the candidate. Chapman and Zweig (2005) suggest that such small talk leads to rapport building while Barrick, Swider, and Stewart (2010) found that "interviewer ratings of candidate competence during rapport building accounted for incremental variance in outcomes beyond the variance attributed to perceived similarity or initial likeability of the candidate" (p. 1169). Holmes and Fillary's study in 2000 further supports this idea. In their analysis of over 500 interactions and 350 hours of tape-recorded workplace small talk collected from various New Zealand offices and factories, including workplaces employing individuals with IDD, Holmes and Fillary note that:

> It is clearly crucial for workplace success that those with intellectual disability acquire the sociolinguistic skills which will enable them to establish good relations with co-workers. An

> attractive and outgoing social manner can have a major impact in predisposing co-workers positively, and can even override irritation when tasks are not done with maximum efficiency. (p. 288)

While these skills are important for employment interviews, few studies have specifically examined interview training for individuals with IDD. In 1977, Grinnell and Lieberman conducted a study with 24 participants (14 female, 10 male) whose average IQ score was 65.4. In this research study, a total of seven skill areas were grouped into three domains:

- Attending skills (eye contact, posture, minimal encourage, and verbal follow)
- Questioning skills (open and closed-ended questions)
- Reflection skills (reflection of content)

Participants were assigned to one of four groups (three experimental groups and one control group) and received video modelling and video feedback of their interview performance. Pre- and post-test scores demonstrated significant improvements in the attending skill areas of eye contact and posture after video modelling and feedback, though no significant statistical differences were found in the other attending skill areas nor in questioning and reflection skills.

In another early employment interview training study involving individuals with IDD, Hall, Sheldon-Wildgen, and Sherman (1980) conducted a multiple baseline across behaviors study. The research team gathered six female participants aged 19 to 41 with a mean IQ of 61 for interview training, which consisted of three types of skills:

(1) Office Skills, which included introducing oneself to a receptionist, stating one's purpose for being there, and following directions;
(2) Application Skills, which involved filling out standard job application forms; and
(3) Interview Skills, which included good posture, appropriate voice tone and rate, and asking and answering questions appropriately. (p. 434)

The study first conducted pre-training probes in the three areas to provide a comparison when generalizing during post-training. Four methods were used to teach the skills: instruction and providing rationales, modelling, role playing, and constructive feedback. With all methods leading to improved performance within the three domains, Hall and her colleagues thus demonstrated the feasibility of improving individuals with IDD's employment opportunities via pen-and-paper technology almost four decades ago. With the dawn of the digital age, the possibility of using more advanced technology to implement even more thorough and efficacious training for individuals with IDD now exists.

## 3. Technology and IDD

The importance of technology, especially assistive technology, in facilitating the transition and employment of individuals with disabilities has been reported in both policy (Individuals with Disabilities Education Improvement Act of 2004, 2011; Workforce Innovation and Opportunity Act of 2014, 2013) and research (Cihak, Kessler, & Alberto, 2007; Cihak, Kessler, & Alberto, 2008; Mechling, Gast, & Seid, 2009; Gentry, 2012). Integrating technology

can create more conducive learning environments for students with IDD by allowing students to learn at their own pace, repeat steps as necessary, and develop a feeling of control over the learning process (Claes, Van Hove, Vandevelde, van Loon, & Schalock, 2012; Wehmeyer et al., 2006). In addition, individuals with IDD demonstrate significant skill acquisition when taught using technology, and many prefer instruction delivered through mobile devices (Shane & Albert, 2008). Researchers have begun to document more closely the benefits of specific electronic technologies for adults with IDD. For example, Stock, Davies, Wehmeyer, and Palmer (2008) found that cell phones provide promise for supporting universal design and that other software development methodologies may in turn increase independent access for students and adults with IDD. Several researchers believe technology helps students learn executive functioning skills (Bauer & Ulrich, 2002; Gillette & Depompei, 2008) and may enhance their academic skills (L. Dieker, Hynes, Hughes, & Smith, 2008).

Technology also has a positive impact on employability preparation. In one study, Wehmeyer et al. (2006) conducted an extensive search for articles published in peer-reviewed journals that addressed the use of technology by people with IDD or developmental disabilities. Thirteen single-subject design studies were selected for inclusion in the meta-analysis involving a total of 42 unique study participants with IDD. The results of the study confirmed indications in the literature that technology use can contribute to more positive vocational and employment-related outcomes for youth and adults with IDD, while the authors point out that perhaps the most compelling finding was that there are still relatively few empirical evaluations of

technology use by people with intellectual and developmental disabilities in the literature. Given the promising findings reported in the study, Wehmeyer and his colleagues suggested that it is necessary to focus more research and development efforts on these types of interventions for this population of learners.

### *3.1. Virtual reality and IDD*

A technique that has shown propitious results in improving the employability of individuals with IDD is the use of virtual reality (VR) tools. Some of the earliest literature on the ability of VR to support individuals with IDD includes a study conducted by Standen, Brown, and Cromby in 2001. Based in the United Kingdom, Standen and her colleagues developed and tested virtual environments in which computer-based instruction was used for teaching community skills to individuals with IDD in four settings: A road crossing, a café, a supermarket, and a factory. Subsequently, Langone, Clees, Rieber, and Matzko successfully replicated the previous study's grocery shopping training in the United States in 2003. The results from both studies indicate that "virtual environments are effective in facilitating the acquisition of living skills and that these skills can transfer from the virtual to the real environment" (Standen et al., 2001, p. 291).

During the same period, Brooks, Rose, Attree, and Elliot-Square (2002) reported similar findings in their investigation of the capacity of VR training to improve the spatial memory and sensorimotor abilities of individuals with learning disabilities, using a pre-post performance

measure. They found that through VR training, participants were better able to remember the physical layout of the environment and that training in virtual environments did improve performance in reality. From these promising studies in the early 2000s, researchers began to appreciate the feasibility of using VR to improve the skills of individuals with IDD.

In a 2005 review of existing research, Standen and Brown found that VR environments have the potential to be effective interventions for individuals with IDD in the acquisition of skills for independent living (grocery shopping, food preparation, orientation, road safety, and vocational training) and the enhancement of cognitive skills. The researchers attribute this to a few characteristics of VR environments: the ease of ensuring a safe environment in which training can take place, the ability to manipulate VR environments to offer additional scaffolding or learning aids should the student require them, and the ease of adjusting task difficulty in order to ensure progression in learning. The ease of manipulating VR scenarios to create such minor differences between scenarios enable individuals with IDD to build up their skills of flexibility and generalization in order to transfer skills across contexts, thereby addressing the problem of individuals with IDD struggling to generalize skills. VR environments offer individuals with IDD a non-threatening and safe space to practice their skills, while also enabling them to transfer their skills to real environments. McMahon, Cihak, and Wright's (2015) work supports these findings, demonstrating that using VR as a navigation tool was highly effective in helping individuals with IDD navigate to employment opportunities, with the effectiveness of VR being

significantly higher than that of traditional tools like a paper map or existing technological tools like Google Maps.

A 2010 study conducted by S. Wallace et al. continued to push the boundaries of the tested applications of VR, demonstrating that children with autism spectrum disorder (ASD) are able to make links between the images in an augmented reality environment and their everyday experiences. The study showed that students with ASD were able to operate in and engage with a virtual environment in the same way as typically developed students, and the students with ASD responded to the VR with significant levels of spatial presence and engagement. These findings suggest that mixed reality can be realistic enough for students with ASD to simulate and assess social situations with which they report having difficulties within the real world (S. Wallace et al., 2010). A subsequent pilot study conducted by Kandalaft, Didehbani, Krawczyk, Allen, and Chapman in 2013 had young adults with high-functioning autism undergo a ten-session VR social skills intervention training program, in which VR environments provided participants the space to practice their social skills within virtual scenarios mirroring various real-life social situations, receive feedback, then incorporate the feedback received into future VR attempts. All participants felt that the practice in the VR training "helped them to gain social skills to maintain a conversation in real life" (p. 42), providing further evidence of VR's potential to improve the social skills of individuals with IDD.

The potential that VR training possesses is significant and was predicted as early as 2005. In a visionary book about the future, Cline went so far as to write in 2005 that VR technology

will lead to numerous important changes in human life and activity. He believes that (a) VR will become part of our daily life and activity; (b) new VR techniques will be invented to influence our actions, thoughts, and communications; (c) as we spend increasingly more time in VR space, there will be a slow "migration into virtual space" (Cline, 2005, p. 154) resulting in important changes to our cultures, economic systems, and perspectives of the world; and (d) VR has the potential to increase humanity's freedom and well-being and to increase social stability during our perennial socio-political evolution. An integral step towards greater freedom and well-being for all must be better employment preparation for individuals with IDD, to which VR has the capacity to contribute in addition to or in conjunction with other training methods.

## 4. Interview preparation for individuals with IDD

### *4.1. Technological methods*

Many encouraging avenues for the utilization of technology to prepare individuals with IDD for employment have emerged including the technique of video self-modelling (VSM). Cihak and Schrader's 2008 pilot study on VSM found that adolescents with autism spectrum disorder (ASD) showed positive effects from watching videos of themselves performing desired vocational chain tasks while Goh and Bambara (2010) concluded that participants with IDD demonstrated an increased ability to perform chained job tasks in community-based employment settings after VSM treatment. Apart from the development of new tools, technology has also allowed for the facilitation of long-standing techniques like video modelling through the use of

mobile technology as Hayes et al. (2015) demonstrated. In their study of 15 students with ASD, a mobile video modelling system was successfully used for interview training, resulting in significantly better employer ratings of the participants in the experimental group than the control group during mock interviews (Hayes et al., 2015).

In a 2009 review of the existing literature on assistive technology as a self-management tool, Mechling and colleagues found that video prompting was among several forms of assistive technology that aided individuals with IDD in task completion while also reducing the need for instructor prompts, thereby aiding individuals with IDD in self-management. With self-regulation increased, individuals with IDD may function more independently and complete tasks on their own. It is worth noting that their review focused on the completion of daily tasks. However, social interactions such as interviews and conversations are more variable and less predictable than daily tasks (making a bed, setting a table, etc.), and existing assistive technology may not sufficiently address this variability. Despite this, VSM, video modelling, and video prompting are all forms of technology that have been found to be efficacious in improving the employment (preparation) skills performance of individuals with IDD.

### *4.2. Virtual reality*

Besides these technological tools, researchers have also found that VR training too improves interviewing skills. Smith and his colleagues concluded in their 2014 study of individuals with ASD that VR interview training produced "(1) significantly improved job interview skills that were characterized by moderate-to-large effect sizes, (2) enhanced job

interview self-confidence, and (3) a progressive increase in simulated interview scores across trials and increasing levels of difficulty" (Smith et al., 2014, p. 2458), compared to the treatment as usual (TAU) group. In a follow-up survey of the 2014 group, Smith et al. (2015) found that VR interview training was effective in improving vocational outcomes for individuals with ASD, with those who had undergone virtual reality job interview training experiencing better vocational outcomes than those who had not.

Smith et al. are not alone in these findings. Most recently, a study conducted by Burke et al. in 2018 on adults with ASD and other developmental disabilities found similarly positive results from the use of an interview-specific VR tool, creating "a measurable and significant improvement in the interviewing skills of participants" (p. 910). Altogether, the literature shows that VR skills training in general and VR interview training, specifically, are valuable and effective treatments that individuals with IDD should receive.

Virtual reality thus proves to be a significant tool for use in enhancing the employability of individuals with IDD. Its potential for positive outcomes makes it a powerful tool for transition educators to use in the classroom, in conjunction with other tools or technologies that can aid individuals with IDD in improving their interview and other employment preparation skills.

### *4.3. Mixed-reality environments*

While VR technology has shown great promise in improving the employability of

individuals with IDD, a technology that combines the best of VR's visual strengths with the advantages of real world interactions has been developed–mixed reality, also known as immersive reality. In a mixed-reality environment, instead of being solely surrounded by technological creations (as in a VR world), virtual objects are seamlessly integrated into the participant's own reality, producing an amalgamation of the two. An example of a mixed-reality environment is TLE TeachLivE$^{TM}$ (Teaching and Learning in Virtual Environments), housed at the University of Central Florida.

In their 2005 paper, Hughes, Stapleton, Hughes, and Smith report how the TLE TeachLivE$^{TM}$ laboratory centers its work on the blending of real and synthetic content. Situated in front of projection and television screens, participants interact with virtual characters (avatars) seen onscreen. Unlike typical VR avatars which are pre-programmed and fixed, these avatars are controlled by human interactors who adopt the nuances of the character to make it come alive for the participant–the motion and the verbal and nonverbal expressions of the interactor are transferred to the virtual character. L. Dieker et al. (2008) describe the work they do in the following way:

> Unlike typical acting, which is based on scripts, and improvisation, which is based on response to an immediate environment, interactors develop a character and then play out that character's behaviors based on family history, ethnic and political identity, living environment, personal motivations, friendships, and so on. In the virtual classroom the

> interactor provides the deep, human, interpersonal behaviors that artificial intelligence is still incapable of producing. (p. 11)

This enhanced level of avatar believability is the key to mixed-reality environments–by increasing the scenario's realism, participants engage in more immersive interactions and training than VR tools alone would allow.

Mixed-reality technologies have primarily been used for teacher training thus far (e.g. Barmaki & Hughes, 2016; Chini, Straub, & Thomas, 2016; L. A. Dieker, Delisio, & Bukaty, 2015; Hayes & Hughes, 2016). However, P. Wallace and Maryott (2009) propose that this technology could have multiple other interesting clinical applications for all individuals with disabilities–including those with IDD–like providing more authentic and naturalistic means of assessing social difficulties. There may also be ways to address specific anxieties and phobias through repeated—yet safe and supported—exposure, as seen in the application of VR to other clinical groups and domains including PTSD (Rizzo et al., 2015; Rothbaum et al., 1999), anxiety disorders (Parsons & Rizzo, 2008; Powers & Emmelkamp, 2008), and eating disorders (Riva, 2011).

The nature of mixed reality readily facilitates person-centered social skills training and the practice of interview-specific skills like using "automatic and brief responses … extending small talk … [and] spotting the errors made when engaged in small talk" (Holmes & Fillary, 2000, p. 288) for individuals with IDD. Other skills that could be practiced and enhanced would include those previously tested in the Grinnell and Lieberman (1977) and Hall et al. (1980)

studies. In TLE TeachLivE$^{TM}$, employment preparation sessions would capitalize on mixed reality's unique ability to immerse participants in the desired environment and the interactors' ability to react spontaneously to the participants' input, instead of being pre-programmed with set responses, to produce highly realistic and effective training scenarios.

In the first study of its kind, Walker, Vasquez, and Wienke (2016) studied the impact of mixed-reality interview training on adolescents with disabilities by having five young adults with IDD practice in the mixed-reality TLE TeachLivE$^{TM}$ environment. The authors aimed to find out if interview practice in TLE TeachLivE$^{TM}$ would improve the young adults' interview skills and whether these skills would transfer to real-life simulated interviews. The former was measured via a rubric that assessed the "overt behaviours, verbal communication style and content" (Walker et al., 2016, p. 78) of participants, while the latter was examined through live interviews with employee experts.

Each treatment package comprised a virtual interview session followed by a live coaching session in which the participant's performance was analyzed and techniques for improvement were proposed by the coach. All participants underwent six treatments each, answering randomly selected questions in each virtual interview session and utilizing strategies from the coaching sessions to improve their performance. Using a pre-post performance measure, the researchers found that participants on average improved by 83% in mixed-reality settings and 30.4% in live settings (Walker et al., 2016). The study thus concluded that the intervention was highly effective in fostering the acquisition of job interview skills, with

interview performance being significantly enhanced in both mixed-reality settings and live settings with professional interviewers.

## 5. Implications for transition practice

Overall, it is clear that technology and its myriad and continuously evolving uses can and will continue to aid individuals with IDD–and all who require additional support–in their efforts to improve their employability. This includes the use of technological tools like VR and mixed-reality environments as well as technological applications like video self-modelling. In fact, the use of video self-modelling could augment mixed reality tools, enabling participants to view their own positive models as part of the treatment. The ease with which various technological practices can be combined for amplification speaks to the bigger picture–as long as educators persist in innovating and challenging the boundaries of current practice with the aid of technology, increasingly new ways to assist individuals with IDD will continue to be developed.

While it is difficult in many cases to determine what will work best when using technology, educators have to use their best judgement. This must be based on the premise of the least dangerous assumption, which specifies that "in the absence of conclusive data, educational decisions ought to be based on assumptions which, if incorrect, will have the least dangerous effect on the likelihood that students will be able to function independently as adults" (Donnellan, 1984, p. 141). For example, the iPad's proliferation in schools took place before evidence-based practices had been established (Ayres, Mechling, & Sansosti, 2013), likely

because educators perceived its usage to be non-detrimental. Prior to the release of the iPad, tablet computers had already been in use in classrooms as an educational tool. The iPad, however, facilitated both the creation of new educational material (digital books, magazines, etc.) and the installation of educational material available in the form of iPad applications (Ireland & Woollerton, 2010), proving itself a significant classroom aid for both teachers and students. Thus, though technology-based interventions may not always lead to improvements, practitioners must not ignore the potential of using technology when teaching those with disabilities.

Given that students with IDD have lower rates of academic, occupational, social, and personal success when compared to their non-disabled peers, individuals with IDD urgently need preparation for potential employment opportunities and must be afforded chances to engage in career preparatory activities with the use of socially and empirically validated methodologies. It is vital for students with IDD to receive sound instructional programming that will adequately prepare them to successfully work and function within their communities. This instruction must provide them with both the social skills to secure and maintain competitive employment and the hard skills to complete job duties. In fact, social skills are so important to this population that Lecavalier & Butter (2010) submit that "social functioning is at the heart of ID [intellectual disability]" (p. 190). It is evident that educators should look for ways to more fully develop job-specific social skills, and that this goal should take on the same priority as content area development.

Resource constraints, however, are a real problem faced by transition educators, and may limit the range of available solutions to address this need. Specific intervention tools, such as the TLE TeachLivE$^{TM}$ model or the VR social skills intervention proposed by Kandalaft et al. (2013), may prove more difficult to replicate on a large scale due to the cycles of active feedback inherent in these intervention strategies. However, VR technology itself is becoming increasingly accessible due to technological advancements, including the higher availability of VR headsets on the market. Transition educators now have access to a tool that, as demonstrated in this paper, has significant potential in helping to improve the social skills of individuals with IDD through training. The increased feasibility and practicality of virtual reality as a tool for this purpose to aid individuals with IDD in attaining transition and employment goals through improving their skills will only continue to increase as technology continues to develop.

In addition, current transition goals related to employment often reflect low expectations for students with IDD to be competitively employed, and these expectations may affect the attitudes of all stakeholders—students, parents, teachers, support personnel—who are involved in creating and implementing transition services, and the outcomes achieved as a result (Grigal, Hart, & Migliore, 2011). Using cutting edge technology to improve outcomes for students with disabilities would enhance curriculum and the practical strategies used in order to improve school instruction. As Ayres and colleagues note, "increasing employment through skill building, support, and opportunity… would have the dual effect of easing these burdens on families and the government while at the same time contributing to the general well-being of the individual"

(Ayres et al., 2013, p. 261). This improvement for individuals with IDD and those around them may produce a positive feedback loop that will further improve societal perceptions of individuals with IDD, resulting in even better employment prospects.

## 6. Conclusion

Specialized technology holds great promise for individuals with IDD who hope to achieve access to and full inclusion within their community. The applications of virtual reality and mixed reality for educating those with social deficits will continue to evolve dynamically, and it is imperative that we address employment rates by including innovative instruction that utilizes the latest technologies and remains in touch with students' needs. Using VR and mixed-reality environments to improve students' interviewing techniques is one example of the technology-enabled vocational and social skills preparation that is needed by students. Transition educators may currently be missing out on a valuable opportunity to reach all learners by ignoring innovative technology that has yet to establish an evidence base. Through the integration of mixed-reality technology into transition education programming, educators may be able to utilize the dynamic nature of mixed-reality environments to address the complex career preparation needs of students with IDD.

## Conflict of interest

The authors declare that they have no conflict of interest.

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