Research Articles and Essays

Effects of Social-Emotional Skills Training Through Computer-Assisted Instruction for Young Adults with Intellectual Disability

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Author Note

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Abstract

Now more than ever, social emotional learning (SEL) is a major contributor to independence, productivity, and societal inclusion, especially for young adults with intellectual disability (ID). This research study examined the effects of social emotional skills training while using computer assisted instruction (CAI) to explicitly teach participants to identify overall emotions in themselves and recognize emotions in others while explicitly learning how to properly respond to those emotions. Participants in this study included five young adults with ID ranging in age from 18-25 also attending a college program in the southeastern United States. Results indicated a functional relation between the CAI and SEL taught with all five participants. Generalization measures of emotions collected at a variety of

times throughout the day (e.g., job placements, internships, homework sessions, and campus activities) were also positive. Social validity data collected from relevant person-centered planning partners that met monthly with participants also suggested the CAI was useful and practical for teaching SEL to students with ID. Maintenance data also indicated positive results as it was collected three months after the study concluded.

Keywords: Social-emotional learning, computer assisted instruction, intellectual disability

Social-emotional learning (SEL) involves: a) acquiring and effectively applying the knowledge, attitudes, and skills to understand and manage emotions; b) set and achieve positive goals; c) feel and show empathy for others, d) establish and maintain positive relationships; and e) make responsible decisions (CASEL, 2013a, 2013b). SEL can include being emotionally self-aware and being able to recognize emotions in others, which can allow individuals to manage their own emotions and their reactions to others (Adibsereshki et al., 2016). SEL can be a major contributor to independence, productivity, and societal inclusion, especially for individuals with intellectual disability (ID). These skills are not innate for individuals with ID. For example, results from Owens et al. (2016) indicated a significant weakness in adults with ID ability to recognize and identify emotions in photographs, especially neutral, compassionate, and angry facial expressions compared to typically developing adults. Additionally, individuals with ID have significant impairments in intellectual functioning and limitations in adaptive behavior skills (e.g., personal care, managing money) that occur prior to age 18 (Schalock et al., 2010). These adaptive deficits can limit functioning in many activities of daily life such as communication, social participation, and independent living, and occur across home, school, work, and community. Individuals with ID have some of the poorest outcomes in these areas resulting in them being less likely to live independently, gain employment, and be engaged in their communities.

The National Longitudinal Transition Study (2012) found students with ID, compared to their peers with other disabilities, were less likely to obtain paid employment while in high school (25% vs. 40%) (Libscomb et al., 2017). Additionally, Anderson et al. (2011) reported only 15% of adults with ID were employed. Despite poor outcomes, researchers found the

majority of individuals with ID indicated their top post-school goals included: (a) being able to live on their own, (b) being self-sufficient, and (c) obtaining employment in their community (Gray et al., 2000; Kelley et al., 2018; Migliore et al., 2007). Research indicates that a lack of SEL skills can impact employment for individuals with ID.

One identified barrier to employment includes job performance, as well as social and soft skills (Riesen et al., 2014). These skills are associated with gaining employment after high school (Cameto, 2005), retaining employment long-term (Elksnin et al., 2001), and participation in their community (Wagner, et al., 2005). Additional studies found employees lost jobs because of their inability to appropriately interact with their colleagues (Chadsey, 2007; Storey & Miner, 2001). Findings from several studies indicated a large portion of job loss was due to problems socially in the workplace (Bullis et al., 1993; Hagner et al., 1992; Johnson et al., 1990). Additional studies suggested employees with disabilities did not lose their jobs because they were unable to perform job tasks, but because they struggled to fit in socially on the job (Butterworth et al., 1994; Chadsey, 2007). Employers have indicated they value these skills over academic skills (Casner-Lotto et al., 2006) and reported the need for these skills to be taught to individuals with disabilities (Ju et al., 2012). Despite the need for instruction in this area, the majority of interventions to teach employment skills have focused on technical skills (Agran et al., 2016).

Researchers have also worked to identify predictors of post-school success for individuals with disabilities. Some identified predictors of post-school success for individuals with ID included having higher social skills (Carter et al., 2012), higher adaptive skills and independence (Carter et al., 2012; Siperstein et al., 2014), and fewer behavioral and/or

emotional problems (Siperstein et al., 2014). These findings indicate the need for instruction on these skills for individuals with ID; however, there is limited research on interventions in this area.

One study, Adibsereshki et al. (2016), investigated the effectiveness of Emotional Intelligence (EI) training on the adaptive behaviors of students ages 14-18 with ID. Using a quasi-experimental design, the experimental group was given 22 intense EI training sessions four times a week for 45 minutes in groups of eight students while the control group did not receive intervention. The topics discussed throughout the intervention included: emotional self-awareness, self-respect, independence, self-assertiveness, empathy, interpersonal communication skills, problem-solving, decision making, goal setting, stress, aggression, anger, happiness, and optimism. Results indicated the experimental group had a substantial increase in their adaptive behavior, communication skills, and social skills scores compared to that of the control group. This study indicated that teaching emotional concepts can improve adaptive skills.

Two other studies, Clark et al. (2018) and Clark et al. (2019) investigated the effects on an intervention called UPGRADE Your Performance on employment soft skills for students with disabilities including multiple participants with ID. These two studies used technology aided instruction to teach soft skills for employment. The soft skills taught included attitude, cooperation, productivity, on-task behavior, reliability, quality of work, teamwork, and communication. Results indicated increases in employment soft skills for all participants across multiple soft skill areas, as well as generalization of those skills across settings. However, only some of the soft skills (e.g., attitude, communication) taught included

elements related to SEL. Even though they might be related to SEL, none of the instruction included explicit instruction focused on emotions and emotional regulation.

One effective method for instruction for individuals with ID, includes Computer Assisted Instruction (CAI). CAI has been identified by the National Technical Assistance Center on Transition as a research-based practice for students with ID (Test et al., 2009). CAI has been defined as "the use of a computer and other associated technology with the intention of improving students' skills, knowledge, or academic performance" (Okolo et al., 1993, p. 1). Other terms have been used to describe this practice including computer-based instruction, computer-mediated instruction, and multimedia instruction. CAI is interactive and can provide examples and feedback to students, as well as include graphics, photographs, audio, text, and video (Hutcherson et al., 2004). CAI includes the use of computers to deliver instruction and enhance an individual's learning ability. CAI has become widely used in society, especially during the COVID-19 pandemic. As this technology advances, the need for software and resources accessible for young adults with ID increases.

Although there is limited research available on the effectiveness of CAI with young adults with ID, there is enough evidence to support the overall benefits. Snyder and Huber (2019) conducted a systematic review of the literature and identified 22 articles investigating the effectiveness of CAI on teaching academic content to individuals with ID. The majority of studies utilized Microsoft PowerPoint for its customization ability and accessibility. Findings indicated CAI is effective for teaching academic skills to individuals with ID. However, results also indicated that individuals with ID may need additional support from instructors. They also found that instructors may need to develop behavior management

strategies to ensure the individual with ID is gaining the most information possible. Lastly, results indicated there are a lot of studies focused on teaching foundational literacy skills in individuals with ID, but there is limited research regarding the teaching skills necessary for the workforce. More research is needed on the effectiveness of CAI instruction on teaching SEL and employment skills.

Another study, White et al. (2016) examined the effectiveness of two CAI programs designed for individuals with Autism Spectrum Disorder (ASD) including (a) a virtual reality program, Brain-Computer Interface for ASD (BCI-ASD) and (b) a psychosocial intervention, the College and Living Success (CLS) program. The participants of this pilot study included five males and three females that were diagnosed with ASD. Each participant was 18 years old or older, enrolled in full-time coursework, and was diagnosed with a co-occurring disorder. This group of eight students was divided into two equal subgroups and assigned an intervention. The results were inconsistent and concluded that further research should be developed on psychosocial and CAI approaches. The study determined that both CAI intervention plans were reasonable to implement, but does not always need to be substituted for the traditional teaching method.

Next, Larson et al. (2016) examined the effectiveness of CAI compared to one-on-one tutoring to teach vocational skills to individuals with ID. The specific areas taught included behavioral limits, rights and responsibilities, and alphabetical sorting. Participants included 15 adults with ID. Eight participants received CAI and seven participants received one-on-one tutoring. Results suggested that a repetitive, computer-assisted training program can produce similar learning outcomes in individuals with ID to those in one-on-one tutoring.

There was improvement in the areas of attentional deficits, stimulus processing inefficiencies, and cognitive load limitations. Despite promising results, CAI was delivered solely by a computer and there was not an instructor as part of the process.

Simpson et al. (2004) conducted a study to examine the effects of combining video and computer-based instruction to teach social skills to four students with ASD. The intervention was a computer-based program with embedded video clips of peers without disabilities displaying examples and non-examples of targeted social skills (e.g., sharing, following teacher directions, social greetings). Participants were required to decipher between examples and non-examples from the video clips. Results indicated all students improved in targeted social skills. Suggestions for future research included, using a multiple probe across behaviors design to target multiple behaviors and determine if participants can generalize their skills to other settings.

There is limited research regarding SEL skills training and CAI combined with explicit instruction for young adults with ID as many studies are commonly combined with young adults with ASD. Adibsereshki et al. (2016) discussed the need for finding instruments that assess social emotional skills in individuals with ID. Despite promising results on teaching soft skills, there was not explicit instruction on emotions and emotional regulation within soft skills training and the existing research was done with high school students (Clark et al., 2018; Clark et al., 2019). Findings from Simpson et al. (2004) indicated participants could learn social skills from computer-based instruction, but they were unable to target multiple behaviors and determine if participants could generalize to other settings. To address these limitations, the purpose of our study was to investigate the effects of CAI displayed

through PowerPoint combined with direct instruction on the acquisition of SEL skills of young adults with ID (18-25 years old) attending an inclusive postsecondary education program (IPSE). The ultimate goal was to further increase the participants emotional self-awareness, and management of emotions, as well as their ability to recognize emotions in others.

Method

Prior to beginning the study, approval was obtained from the Institutional Review Board for research at the university where the study was conducted. Before starting the study, researchers explained and obtained the necessary student consents or parent consents and student assents. Participants proceeded with the study for one academic semester (15 weeks and a three month maintenance session) as necessary signed assents and consents were completed.

Participants

Participants included five young adults with ID between the ages of 18 and 25 attending an IPSE designed for individuals who had completed a high school certificate of attendance or career focused diploma track. All five participants had full access and participation in all college opportunities at the university. This program required participants to live on campus, attend college activities, audit courses with their peers, complete paid and unpaid job internships, and work on goals towards their two-year certificate of accomplishment. Participants in this study met the following inclusion criteria: (a) were between the ages of 18 and 25, (b) provided student consent if age 18 or older and declared their own guardian or parental consent and student assent if they were not their own guardian, (c) had a documented ID based on a psychological or medical assessment within the last five

years, and (d) willingness and interest to learn about their emotions.

Carla

Carla was a 19-year-old, Caucasian female, with mild ID (IQ=58). Carla did not have any adaptive assessment results to report from her latest psychological report. Carla had recently graduated from high school in a career focused preparation track. This was her first semester attending the IPSE program. Carla's teachers had noted her desire to learn in the classroom and have a paid job after high school. She had noted success from her teachers for being cooperative for a majority of time, but some noted discrepancies in controlling emotions or reactions with respecting others personal space in comparison to her same-age peers and authority figures.

Kandace

Kandace was a 20-year-old, Caucasian female, with moderate ID (IQ=48) and Down syndrome. According to her most recent adaptive assessment, overall skills fell in the below average (SS=80). Kandace had also recently graduated from high school in a career focused preparation track. This was her first semester attending the IPSE program. Kandace's high school teachers noted her starting to "come out of her shell" more, but that she was still extremely shy in comparison to her peers. Kandace also has a harder time due to her shyness in fully expressing her emotions, stress, or frustration to others rather than responding with, "I don't know" or crying.

Thomas

Thomas was a 19-year old, Caucasian transgender, with borderline ID (IQ=71) and a history of anxiety with clinically elevated scores for behavioral and emotional regulation of emotions. Thomas has recently graduated from a small private school. This was his first

semester attending the IPSE program. Thomas's teacher and family noted auditory processing concerns and noted recommendations from continued work with therapy and mindfulness strategies.

Donald

Donald was a 20-year-old, Caucasian male, with mild ID (IQ=69), cerebral palsy, and anxiety disorder. No adaptive scores were included in his recent psychological report. Donald has been enrolled in the IPSE program and has participated in a variety of paid internships within office settings as well as outdoors with landscaping. This was his third semester in the IPSE program. Donald's teachers and family noted his desire to please others and pleasant demeanor among everyone he meets. They did also note his anxiety and tendency to have some short term memory loss and needing things repeated frequently.

Mark

Mark was a 25-year-old, Caucasian male, with a moderate ID (IQ=40) and Down syndrome. According to his most recent adaptive assessment, overall skills fell in the extremely low range with a general adaptive composite score of 56. Since graduation from high school, Mark has worked within the food service industry and attended some independent living programs prior to attending this IPSE program. This was his third semester in the postsecondary education program. Mark's family reported he had participated in counseling for several months prior to being admitted to college to further address some stress management techniques and past trauma. Mark reported he does experience sadness sometimes especially now with COVID and missing his family, but says he is happiest when he wakes up in the mornings.

Setting

All baseline, CAI lessons, generalization, and maintenance sessions were conducted at various locations on a public, accredited university campus in a rural area in the southeastern United States. The campus is housed on approximately 600 acres to more than 12,000 students. Out of this enrollment, over 400 students (3.3%) had reported and requested accommodations through the Office of Accessibility Resources. The campus includes 13 residence halls, 14 classroom buildings, seven performing arts buildings, 12 recreational buildings and fields, three dining and food courts, and 10 administrative support buildings. Additional campus locations included student centers, community convenience and retail stores, commercial restaurants, banks, and religious organizations. Most of the CAI lessons were delivered within one of the four IPSE program office spaces which commonly included a computer or laptop, whiteboard, markers, two chairs, a desk or table, and provided a quiet and less distracting location.

Materials

Teaching materials included CAI consisting of PowerPoint slides with digital photographs and videos of various emotions and facial expressions. Word cards of emotions with matching photos were also used during baseline, laminated, and placed on a small book ring for easier review. Photographs and video footage embedded within the scripted PowerPoint lessons were from Google Images and YouTube. CAI lessons were delivered by the first researcher through her laptop and recorded to be reviewed by the other two researchers for procedural fidelity and interrater reliability.

Data Collection

Dependent Variables

Data were collected on 12 emotional concepts and their distinguishing characteristics

including facial expression, body language, and tone of voice. See Table 1 for 12 concepts and defining characteristics for each CAI lesson.

Table 1

Concepts with Emotions and Associated Facial Expression, Body Language, and Tone of Voice

Week and Concept	Emotion	Facial Expression	Body Language	Tone of Voice
1 Emotional Self-Awareness	Happy	Smiling	Relaxed	Upbeat
2 Self-Respect	Lonely	Frowning	Inward	Gloomy
3 Independence	Overwhelmed	Stressed	Tense	Intense
4 Assertiveness	Excited	Open Smile	Tensed	Enthusiastic
5 Empathy	Worried	Concerned	Hands Close to Mouth	Shaky
6 Problem Solving	Mad	Eyebrows Down	Tense	Angry
7 Decision Making	Confused	Raised Eyebrow	Not Confident	Perplexed
8 Goal Setting	Tired	Droopy Eyes	Relaxed	Slow
9 Impulse Control	Irritated	Glare	Tensed	Annoyed
10 Stress Tolerance	Motivated	Grin	Relaxed	Positive
11 Happiness	Sad	Frown	Head Down	Shaky
12 Optimism	Peaceful	Eyes Closed	Relaxed	Calm

The dependent variable collected was the matching facial expression, body language, and tone of voice description for each emotional concept. A correct response (3/3) identified

and described all three characteristics (facial expression, body language, and tone of voice) of each emotion. A partially correct response (2/3 or 1/3) identified and described one or two of the three characteristics of the emotional concept, and an incorrect response (0/3) identified and described no characteristic of the emotional concept. Probes were collected and scored all at once during baseline for the 12 emotions and three characteristics for each. Probes during intervention were collected after lessons 3, 6, 9, and 12. Each probe was cumulative to include the previous lessons before the next three lessons taught and probed. In addition, setting/situation generalization data (Cooper, Heron, & Heward, 2007) were collected at minimum 2-3 times per week using an app called *Mood Ring: Your Emoji Journal* at a variety of campus events and activities. Maintenance data were collected three months after the CAI intervention lessons had ended.

Social Validity

Social validity data were collected from participants at the end of the study to evaluate the social acceptance of procedures (Wolf, 1978). Participants' perceptions were read and collected by a student support who was not associated or involved in the research study, but was familiar to the participants through a questionnaire to determine their level of satisfaction with using CAI and explicit instruction to recognize emotional concepts and characteristics. The questionnaire included a 4-point Likert scale (i.e., 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree) given at the conclusion of this study. The questionnaire took less than 10 minutes to complete (see Table 2 for the social validity questionnaire).

Table 2

Participant Responses to the Social Validity Survey

Item	Ratings
The lessons helped me recognize my emotions better.	3.6
The lessons were easy to use and follow.	3.0
I learned more about how to tell others how I feel.	3.6
The lessons helped me learn how to control my emotions.	3.4
I would like to tell my friends about how they can control their emotions.	3.6
The way I express my emotions have improved since I have done this study.	3.4

Note: 1= strongly disagree; 2= disagree; 3 = agree; 4 = strongly agree

Additionally, social validity was gathered from student supports who worked with participants on a weekly and monthly basis with their person-centered planning (PCP) meetings. After having three monthly PCP meetings with the same students, the student supports were asked to complete a social validity questionnaire that also used a 5-point Likert scale (i.e., 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree) to evaluate the overall emotional skills displayed during the monthly PCP meetings to see if CAI paired with explicit instruction may have influenced their reaction to their emotions or others emotions during their monthly meetings during and after the intervention had concluded. This questionnaire was sent to student supports using Surveymonkey® with seven Likert scale questions and two open ended questions. Questions related to participants being able to identify, express, and control their emotions more regularly during PCP meetings and preparation times. Questions also inquired about their overall impulse control, assertiveness, problem solving skills, and improvement with taking criticism during these meetings (see Table 3). The open ended questions asked about their observed areas of most and least

growth areas related to emotions throughout the semester.

Table 3

PCP Partner Responses to the Social Validity Survey

Item	Ratings
The student showed improvement in **identifying their emotions.**	4.2
The student showed improvement in **expressing their emotions.**	3.2
The student showed improvement in **controlling their emotions.**	3.8
The student showed improvement in **impulse control.**	4.2
The student showed improvement in their **assertiveness**.	3.0
The student showed improvement in **problem solving skills.**	3.2
The student showed improvement in taking **criticism.**	3.6

Note: 1= strongly disagree; 2= disagree; 3 = neutral; 4 = agree; 5= strongly agree

Design

The experimental design was a multiple probe across behaviors design to evaluate the effects of CAI with embedded model, lead, test explicit instruction on emotional skills training across multiple participants.

Baseline

During baseline, participants were given word cards of 12 emotions and asked to describe the characteristics related to those emotions in regards more specifically to the associated facial expression, body language, and tone of voice. Participants were given two attempts and wait time of 15 seconds for each emotion to start defining their characteristics. If no response was given and wait time exceeded, the researcher moved to the next emotion and started over with the wait time. All cards were given at each baseline attempt and correct

and incorrect responses were recorded. A new baseline was recorded in a new session or day rather than administered again or repeatedly in the same session or day.

Computer Assisted Instruction

All 12 concept lessons delivered through CAI followed a scripted lesson as well as PowerPoint format for each session. Each CAI lesson began with an introductory concept slide with the title, activity, review, and/or homework review from the previous lesson, and then introduced a new emotion of the week (with associated images and words to describe the facial expression, tone of voice, and body language) of that emotional concept. Once the emotions were introduced with characteristics, the concept was also introduced with an initial title slide followed by a discussion and definition or rationale of that concept's importance to that associated emotion. Typically a lesson then went into an interactive activity or video to apply that emotion and concept to a practical scenario. For example, with decision making, it was first defined, then a discussion followed about why making decisions was important followed by a video and list for making a pros and cons list. Guided practice continued for five practice scenarios (continuing to follow the model, lead, test format). One of the five practice scenarios given had the participant identify the emotion associated with the practice scenario and then what the emotion would look like in relation to the overall facial expression, body language displayed, and tone of voice. (e.g., How do you feel when you "make a good grade on your homework assignment?"). A participant might respond with the emotion identified as "happy" with the facial expression of smiling, body language as relaxed, and tone of voice being more upbeat. Once the scenarios were given and discussed, a probe was given after three lessons OR if not a time to collect probes, then homework was explained to prepare for the next session. Most homework included recording their emotions for the week and explaining a sentence for why they felt that way. Each lesson was one hour

in length per concept.

Maintenance and Generalization

Maintenance and generalization data were collected to determine the extent to which participants continued to perform targeted behaviors after the CAI intervention had ended and to see if the emotional recognition skills taught would generalize to novel situations and settings. Maintenance data were collected on the 12 emotional concepts and characteristics three months after intervention had ended. Measures of generalization were collected weekly using the *Mood Ring: Your Emoji Journal* app for iOS devices. Emotions recorded were gathered at the beginning of each session and discussed. Each participant was asked to use the app to record their emotions several times per week across various settings and situations (at work, during homework, leisure, alone time in their room, and/or with friends). This was collected and discussed by the first researcher who also implemented the CAI lessons during their homework review times each week.

Interrater Reliability

Interrater reliability data were collected on 25% of the dependent variable by a second observer using the same type of scoring sheet used by the researcher. The second and third observers collected data on video probes collected after lessons 3, 6, 9, and 12. An agreement was recorded when observers identically scored the outcome as correct or incorrect (i.e., 0-3). A disagreement was recorded if outcomes of cumulative probes were not scored the same. The percentage of agreement for correct responses was calculated by dividing the number of agreements plus disagreements, and multiplied by 100. Overall interrater reliability was 100% during baseline, intervention, and maintenance. Interrater reliability was not calculated for generalization measures.

Procedural Fidelity

A procedural fidelity checklist was used for CAI lessons along with the training script for each lesson. Procedural fidelity data were collected for 25% of the sessions distributed across participants by all the researchers and one outside observer. Fidelity was calculated as the number of main ideas followed from the script and CAI lessons followed correctly divided by the total number of main ideas listed within the script and CAI lessons and multiplied by 100. Procedural fidelity was 100% across all sessions and phases.

Results

Figures 1-5 presents the percentage of correct responses for the emotions and associated characteristics (facial expression, body language, tone of voice). The *x-axis* represents the lesson probes (conducted after lessons 3, 6, 9, and 12) and the *y-axis* represents the percentage correct based on the 0-3 scoring scale described above.

Carla

During baseline, Carla's performance was 31% for all 12 emotional responses and characteristics. During intervention, with Lessons 1-3 (happy, lonely, overwhelmed) Carla's level of performance was 83%. For the second probe with Lessons 4-6 (happy, lonely, overwhelmed, excited, worried, mad) Carla's level of performance was 89%. For the third probe (adding confused, tired, and irritated) Carla's level of performance was 74%. And finally, during the fourth probe (adding all previous emotions plus motivated, sad, and peaceful) Carla's level of performance was 72% (see Figure 1). During maintenance, Carla's performance on all emotional responses and characteristics identified after three months was at 63% During generalization, Carla was able to use the app with reminders one time each week.

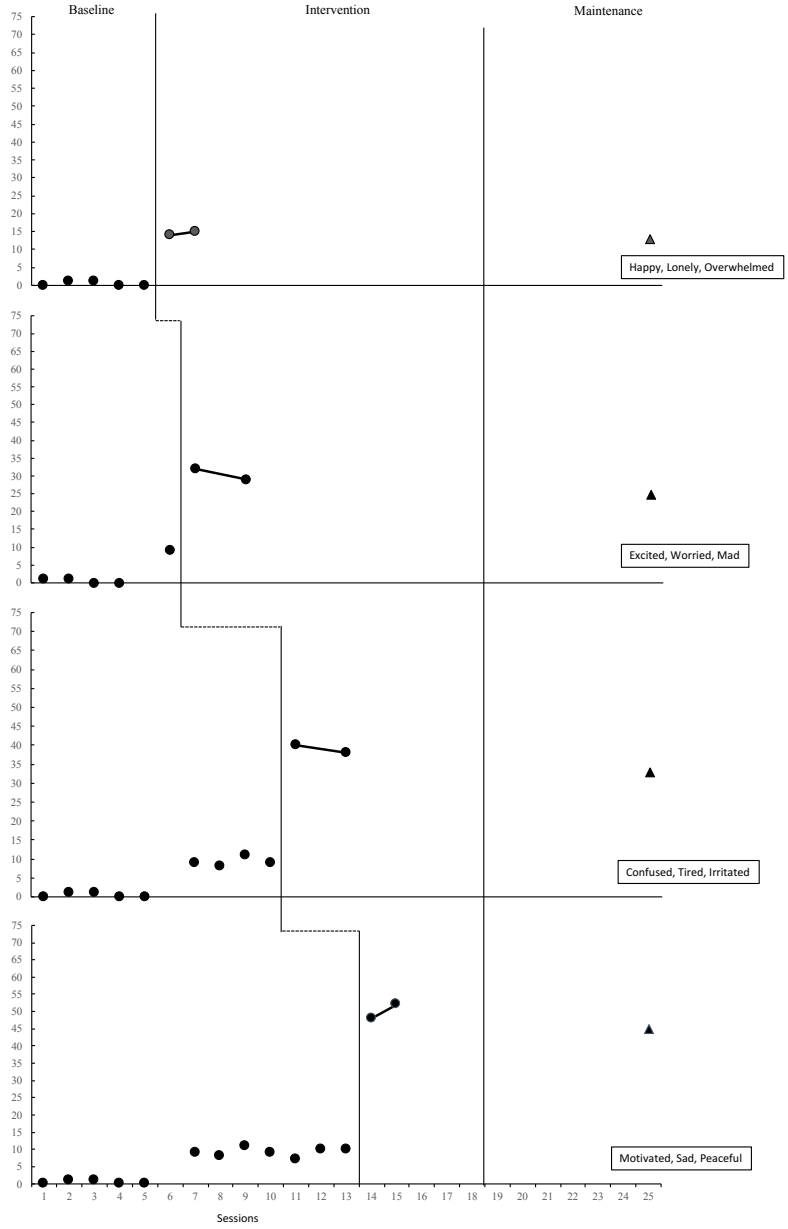

Figure 1. *Carla's* Performance on Emotional Skills and Characteristics
(● = Score, ▲ Maintenance)

Kandace

During baseline, Kandace's performance was 6% for all 12 emotional responses and characteristics. During intervention, with Lessons 1-3 (happy, lonely, overwhelmed) Kandace's level of performance was 78%. For the second probe with Lessons 4-6 (happy, lonely, overwhelmed, excited, worried, mad) Kandace's level of performance was 75%. For the third probe (adding confused, tired, and irritated) Kandace's level of performance was

70%. And finally, during the fourth probe (adding all previous emotions plus motivated, sad, and peaceful) Kandace's level of performance was 72% (see Figure 2). During maintenance, Kandace's performance on all emotional responses and characteristics identified after three months was at 43%. During generalization, Kandace was able to use the app or recording her emotions on paper with reminders on average zero times each week.

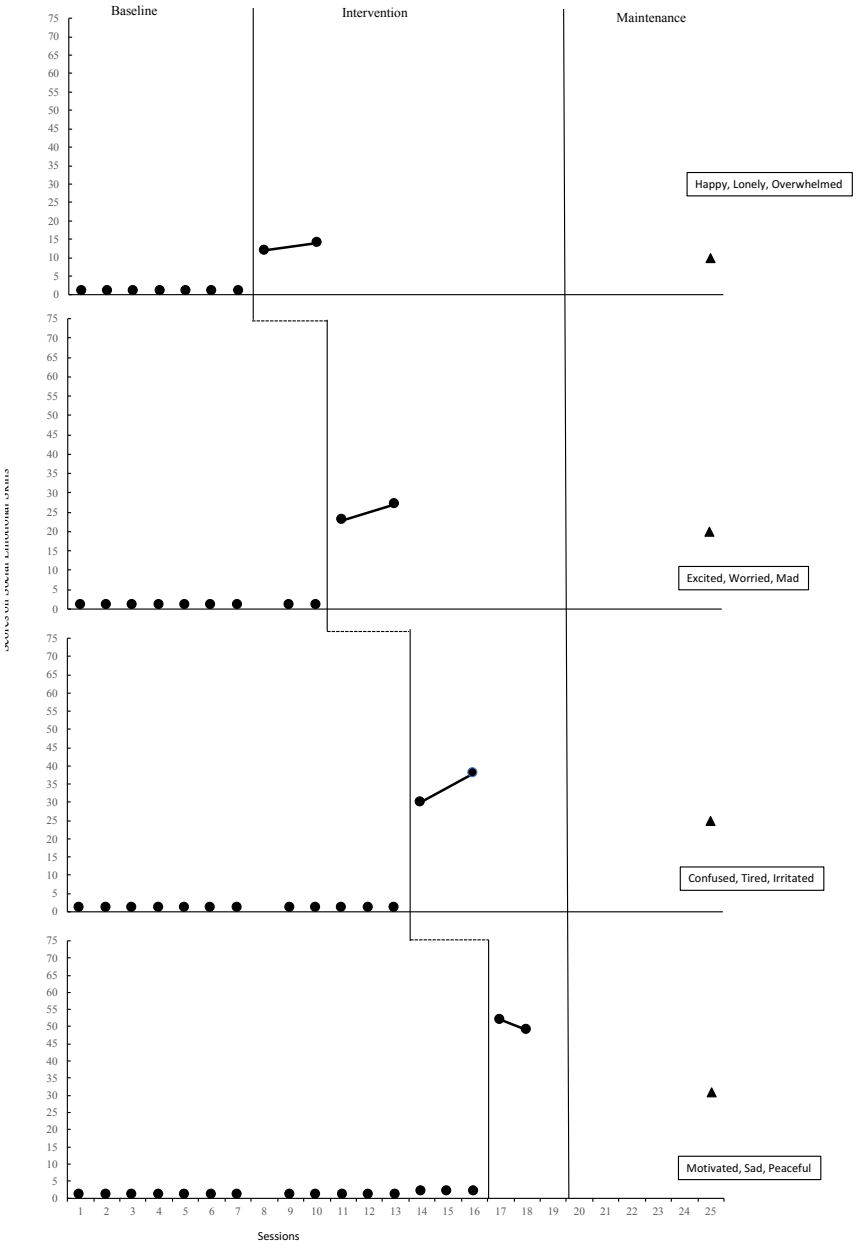

Figure 2. *Kandace's* Performance on Emotional Skills and Characteristics (● = Score, ▲ = Maintenance)

Thomas

During baseline, Thomas's performance was 72% for all 12 emotional responses and characteristics. During intervention, with Lessons 1-3 (happy, lonely, overwhelmed) Thomas's level of performance was 100%. For the second probe with Lessons 4-6 (happy, lonely, overwhelmed, excited, worried, mad) Thomas's level of performance was 100%. For the third probe (adding confused, tired, and irritated) Thomas's level of performance was 100%. And finally, during the fourth probe (adding all previous emotions plus motivated, sad, and peaceful) Thomas's level of performance was 100% (see Figure 3). During maintenance, Thomas's performance on all emotional responses and characteristics identified after three months was at 96%. During generalization, Thomas was able to use the app without reminders three times each week and continues to use the app to record his emotions.

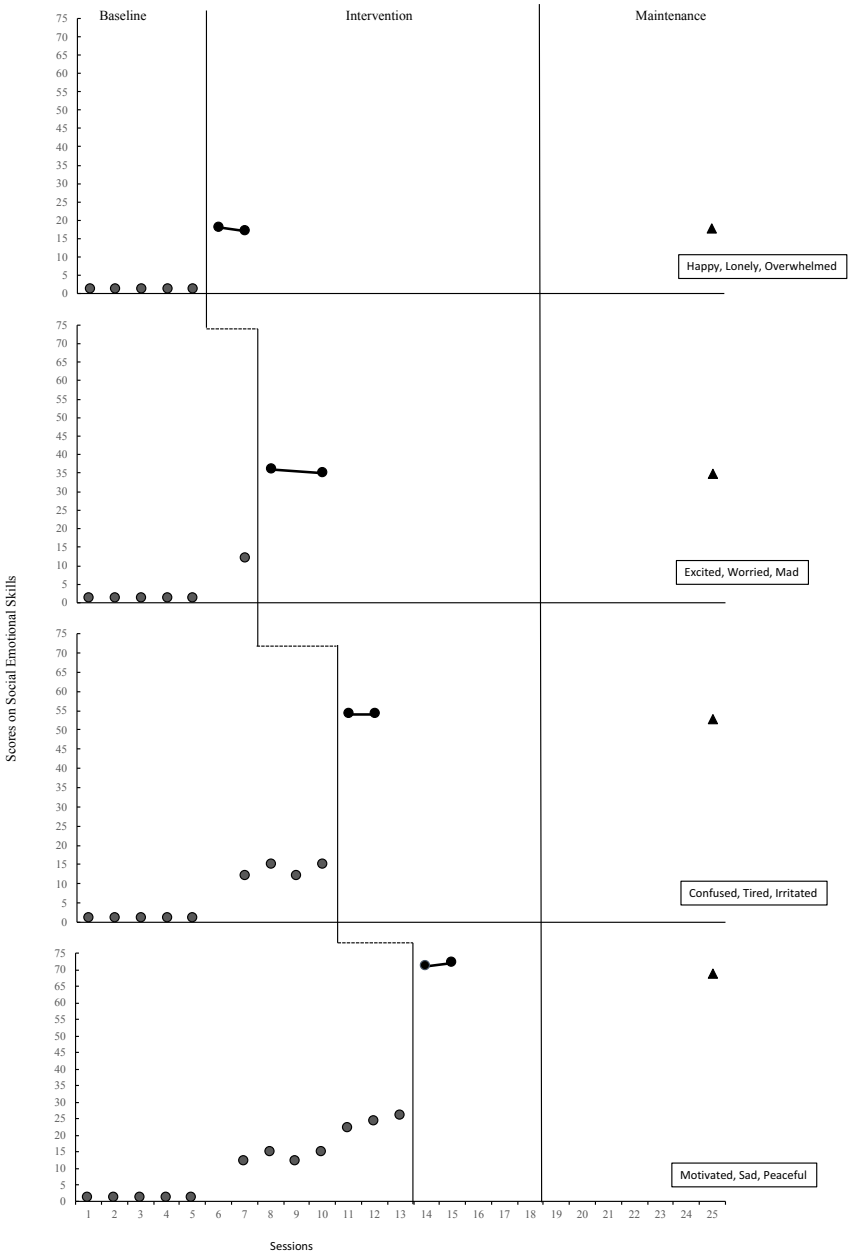

Figure 3. Thomas's Performance on Emotional Skills and Characteristics
(● = Score, ▲ Maintenance)

Donald

During baseline, Donald's performance was 47% for all 12 emotional responses and characteristics. During intervention, with Lessons 1-3 (happy, lonely, overwhelmed) Donald's level of performance was 89%. For the second probe with Lessons 4-6 (happy, lonely, overwhelmed, excited, worried, mad) Donald's level of performance was 97%. For

the third probe (adding confused, tired, and irritated) Donald's level of performance was 89%. And finally, during the fourth probe (adding all previous emotions plus motivated, sad, and peaceful) Donald's level of performance was 83% (see Figure 4). During maintenance, Donald's performance on all emotional responses and characteristics identified after three months was at 61%. Donald did not have an iOS device; therefore, he regulated his emotions on paper. During generalization, Donald recorded his emotions on paper without reminders two times each week.

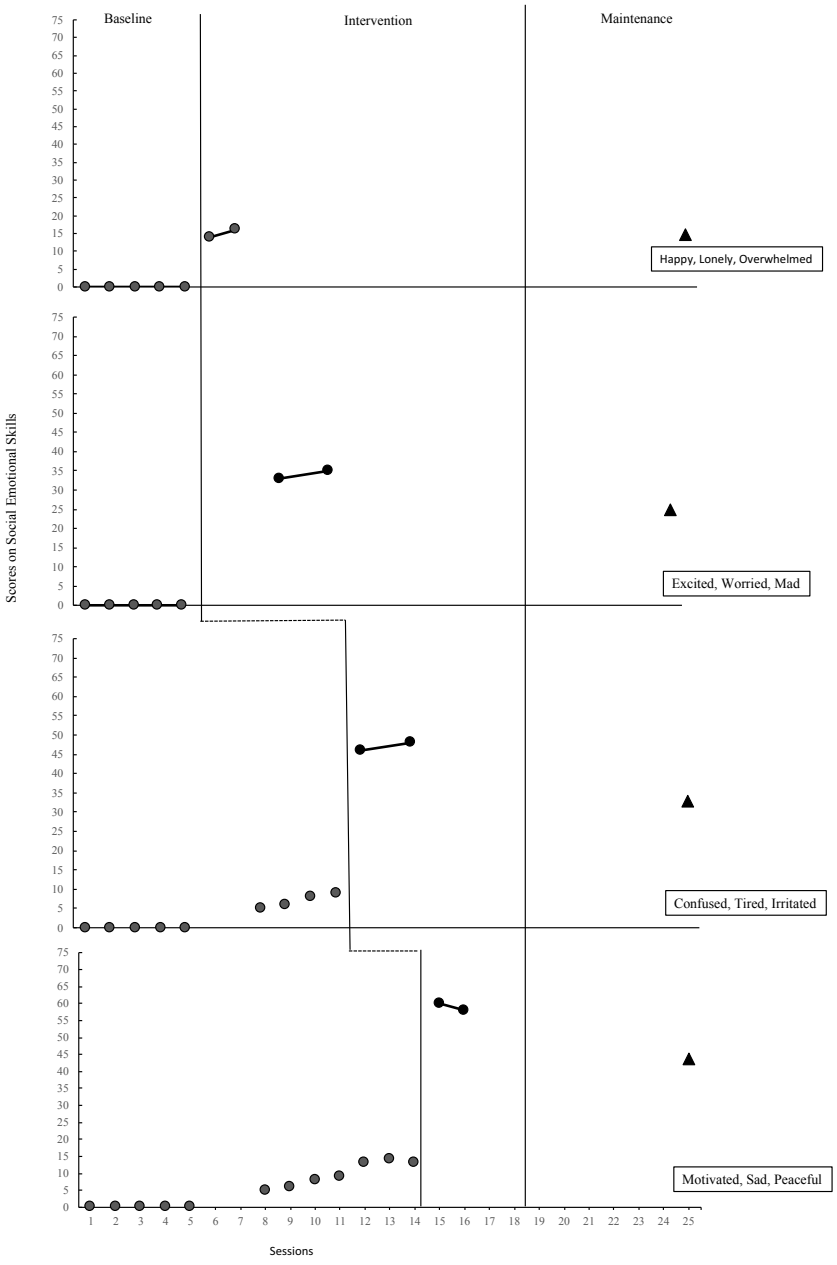

Figure 4. *Donald's* Performance on Emotional Skills and Characteristics
(● = Score, ▲= Maintenance)

Mark

During baseline, Mark's performance was 53% for all 12 emotional responses and characteristics. During intervention, with Lessons 1-3 (happy, lonely, overwhelmed) Mark's level of performance was 100%. For the second probe with Lessons 4-6 (happy, lonely, overwhelmed, excited, worried, mad) Mark's level of performance was 94%. For the third probe (adding confused, tired, and irritated) Mark's level of performance was 91%. And

finally, during the fourth probe (adding all previous emotions plus motivated, sad, and peaceful) Mark's level of performance was 92% (see Figure 5). During maintenance, Mark's performance on all emotional responses and characteristics identified after three months was at 81%. Mark was able to use the app on his iOS device for the first two months and later record his emotions on paper the last two months. During generalization, Mark was able to regulate his emotions with the use of the app with reminders three times each week and on paper without reminders two times each week.

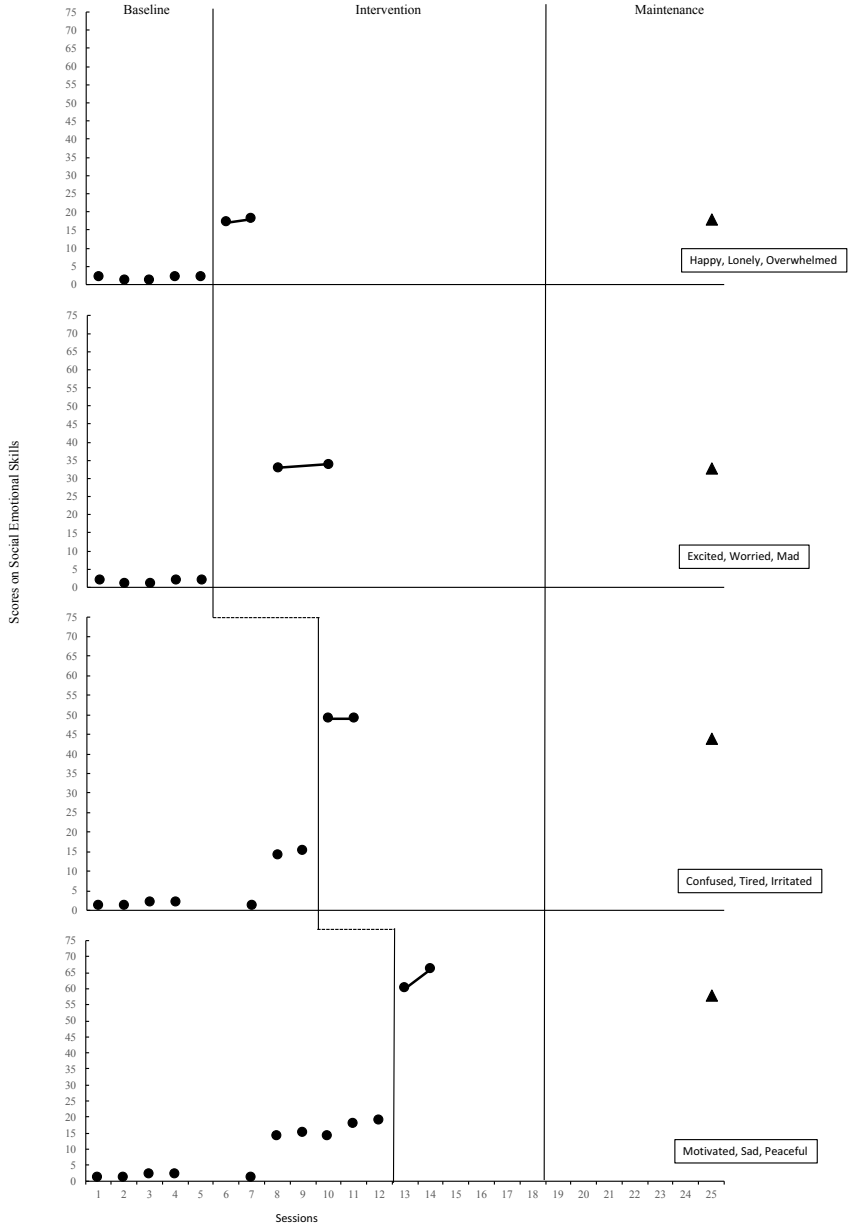

Figure 5. *Marks's* Performance on Emotional Skills and Characteristics (Score, Maintenance)

Social Validity

Social validity data were collected from participants at the end of the study. The mean ratings ranged between 3.0 and 3.6 (i.e., agree or strongly agree). The lowest rating was the 3.0 (lessons being easy to follow) with mean ratings of 3.4 across all questions.

Participants were also asked two open ended questions related to what they enjoyed most and least about the CAI lessons. Participants indicated they liked the one-on-one time and being able to learn how to recognize and control their emotions. Participants indicated they did not like the homework, doing the baseline with blue word cards, and had a harder time showing their emotions behind a mask (due to the COVID pandemic).

In addition, social validity data were collected from five undergraduate students who served as monthly PCP partners to the participants in the study. These give students were paid to provide support to participants 10 to 15 hours per week and helped them reflect at least monthly on their individualized plans for college participation (IPCP). All five of them observed the participants during more critical times when they were planning or leading their own PCP meetings. At the end of the training, a 5-point Likert scale questionnaire was distributed to them through Surveymonkey® and evaluated for appropriateness of procedures, practicality, and relevance for using CAI to recognize their emotions. The mean ratings ranged between 2.0 and 5.0 with a range of 3.0 to 4.2. Most items were rated as agree or strongly agree. Areas of most growth from open ended comments were with emotions overwhelmed and motivated while areas of least growth with emotions were also motivated, excited, and worried.

Discussion

The purpose of this study was to investigate the effects of using CAI displayed

through PowerPoint and use of explicit instruction (model, lead, test) on emotional skills training with young adults with ID (18-25 years old) participating in an IPSE program. Findings indicated a functional relation between the CAI and emotional skills training for all participants with changes in level and trend across behaviors and phases. All five participants increased their emotional skills knowledge by participating in this study and maintained some of these skills three months after intervention had ended.

Overall, results of this study support previous research related to emotional skills training and CAI. First, current findings from this study suggest young adults with ID can learn emotional regulation for themselves and others when explicitly taught as found in Adibsereshki et al. (2016). Second, this study extends previous research that used technology to teach emotional and problem solving skills needed for employment to college aged students (Clark et al., 2018; Clark et al., 2019). And finally, this study further extends the populations for increased generalizability as well as the evidence-base for using CAI paired with explicit instruction to further teach SEL skills to young adults with ID (Larson et al., 2016; Snyder & Huber, 2019; Simpson et al., 2004; White et al., 2016).

Maintenance data from this study were positive in comparison to the intervention phase ranging from 43% to 96% after three months without any further instruction beyond the intervention phase to identify, recognize, and respond to the emotional characteristics taught during the CAI lessons. Based on social validity data from participants, findings were positive across the participants and indirect consumers for increasing their SEL skills.

Limitations and Suggestions for Future Research

This study had several limitations and suggestions for future research. First, there is limited generalizability of findings since the intervention was delivered in a one-on-one

format to minimize off-task behaviors. This was a time-consuming instructional intervention requiring 60 hours of teaching time. Future research could explore delivering the CAI lessons in small or larger groups to further compare results. It would also be good to expand research beyond young adults with ID (e.g., Autism, Traumatic Brain Injury). Second, since this study was conducted during a pandemic, the masks limited full facial expressions. Future research should continue to deliver and explore this instruction when not in a Coronavirus Pandemic with mask mandates. Third, participants in this study received other social skills instruction throughout their college experiences related to communication and emotion (e.g., counseling, peer mentoring, weekly social skills groups, and speech or recreational therapy). These opportunities could have influenced the progress made in this study in combination with the CAI instruction. Future research may be able to further control some of these outside influences. Fourth, using technology has some advantages for some, but not all. Generalization measures were limited in this study because some participants did not prefer to access the mood app (only an iOS app) to record their emotions in other settings. This makes some of the generalization measures harder to report with some resistance or limited access to technology. Future research studies could expand generalization of emotional regulation and offer more journaling across settings with and without technology. Finally, CAI lessons and the social validity measures were gathered from undergraduate paid supports for the program working directly with participants on a weekly basis. Therefore, these individuals reading the questionnaire were not neutral to the participants since they worked with them in other capacities. Future research could explore addressing this limitation of familiarity with collection of social validity measures.

Implications for Practice

There are several implications for practice. First, the lesson delivery even through

CAI was delivered intensely and one-on-one each week making it time intensive for the participants and instructor. Frequent breaks are encouraged in order to help minimize guessing and distractions during the lessons. Second, with the CAI lessons, more focus should be given on the specific emotional concepts linked to their emotions and distinct characteristics. The association of the characteristics could have potentially been memorized rather than being further applied. Third, if this were taught again, lessons would be revised to include less video instruction and more role-play opportunities to maximize teachable moments with identifying, describing, and recognizing emotions. Finally, as with many studies, increased opportunities for generalization in realistic places immediately following the weekly lessons would always be good to expand.

Teaching emotional skills regulation using CAI paired with explicit instruction appears to have promising results for identifying and recognizing emotions. When using CAI it is important that instruction remains age appropriate and interactive while keeping individuals engaged in problem solving and practical application “checkpoints” throughout the lessons. Although results from this study were positive, this is one of the first studies that has paired CAI and emotional skills training with individuals with disabilities.

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