TEACHING PROBLEM-SOLVING SKILLS AS A SOFT SKILL FOR EMPLOYMENT TO INDIVIDUALS WITH AUTISM AND INTELLECTUAL AND DEVELOPMENTAL DISABILITIES USING VIDEO MODELLING IN A VIRTUAL LEARNING ENVIRONMENT

Cliff Oliech

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The degree of Doctor of Philosophy

By
Cliff G. Oliech

May 2023
TEACHING PROBLEM-SOLVING SKILLS AS A SOFT SKILL FOR EMPLOYMENT TO INDIVIDUALS WITH AUTISM AND INTELLECTUAL AND DEVELOPMENTAL DISABILITIES USING VIDEO MODELLING IN A VIRTUAL LEARNING ENVIRONMENT

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ABSTRACT

TEACHING PROBLEM-SOLVING SKILLS AS A SOFT SKILL FOR EMPLOYMENT TO INDIVIDUALS WITH AUTISM AND INTELLECTUAL AND DEVELOPMENTAL DISABILITIES USING VIDEO MODELLING IN A VIRTUAL LEARNING ENVIRONMENT

By
Cliff Guya Oliech
May 2023

Dissertation supervised by Bridget Green, Ed.D., Assistant Professor

Individuals with Autism (ASD) and Intellectual and Developmental Disabilities (IDD) exhibit poor post-secondary education employment outcomes compared to their disabled and non-disabled peers (Shattuck et al., 2012; Taylor et al., 2015). In addition, due to the COVID-19 pandemic school closures, students with ASD and/or IDD in post-secondary transition programs may have lost crucial instruction time, possibly putting them at risk for unemployment and underemployment. Consequently, this research study sought to establish through multiple-baselines across participants design how effective VM can be in teaching problem-solving skills as a soft skill for employment to post-secondary transition education students with ASD and/or IDD in a virtual learning environment. The study was conducted in a post-secondary transition program and included four 20-year-old participants with ASD and/or IDD. The participants learned how to solve work-related problems using a variety of VM demonstrations through a
virtual learning platform. The VMs shown to the participants utilized a self-determined learning model (SDLM) for problem-solving (i.e., a three-step process for systematically solving problems through self-talk). The study results revealed that VM was highly effective ($d = 2.0; SE = 0.44; 95\% \text{ CI} [1.04 - 2.89]$) in teaching problem-solving skills to the four participants through a virtual learning platform. Despite observed variability in participant performance, they maintained the learned problem-solving skills and generalized them to solve new problems in an actual work setting. Data from the social validity questionnaire also indicated that the intervention had a desirable effect on the participants and their teachers/job coaches who participated as observers in the study. The participants reported that they enjoyed learning about problem-solving skills using VM in a virtual learning environment and believed their peers not involved in the study could also benefit from the intervention. The teachers/job coaches also said they would be willing to apply VM to teach problem-solving skills in their classrooms post-study.
DEDICATION

I dedicate this dissertation to my beloved parents, who prepared me for this opportunity by instilling in me the values of discipline and hard work that I would require to succeed in the graduate school of my dream. I appreciate them for believing in me by giving me access to the best education they could afford in my early years while sacrificing their professional development and growth.
ACKNOWLEDGMENT

This work would not have been possible without my advisor and dissertation chair, Dr. Bridget Green, who has repeatedly proved that she cares about my success and will continue to advocate for me in many ways to ensure my success. I would also like to express my sincere gratitude to my dissertation Committee, which consists of Dr. Reva Mathieu-Sher, and Dr. Elizabeth McCallum, for taking the time to review my work and guide me in the right direction with feedback that enabled me to produce the quality dissertation paper.

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To my family in Kenya and Pittsburgh, thank you so much for being my support system and always cheering, trusting, and believing in me. Many thanks to Lauren, my wife, for always being my cheerleader and providing unending encouragement even when things always seemed bleak.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>iv</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>vi</td>
</tr>
<tr>
<td>ACKNOWLEDGMENT</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xvi</td>
</tr>
<tr>
<td>Chapter I</td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Background Information</td>
<td>1</td>
</tr>
<tr>
<td>Problem Statement</td>
<td>2</td>
</tr>
<tr>
<td>Significance of the Problem</td>
<td>5</td>
</tr>
<tr>
<td>State of Employment of Individuals with a Disability</td>
<td>5</td>
</tr>
<tr>
<td>Importance of Work</td>
<td>8</td>
</tr>
<tr>
<td>Purpose Statement</td>
<td>9</td>
</tr>
<tr>
<td>Research Questions</td>
<td>10</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>11</td>
</tr>
<tr>
<td>Chapter II</td>
<td>18</td>
</tr>
<tr>
<td>Literature Review</td>
<td>18</td>
</tr>
<tr>
<td>Overview</td>
<td>18</td>
</tr>
<tr>
<td>Autism, Intellectual, and Developmental Disabilities</td>
<td>18</td>
</tr>
<tr>
<td>Video Technology</td>
<td>21</td>
</tr>
<tr>
<td>Brief Overview of Legislation</td>
<td>23</td>
</tr>
<tr>
<td>Soft Skills</td>
<td>26</td>
</tr>
<tr>
<td>Importance of Problem-Solving Skills</td>
<td>28</td>
</tr>
<tr>
<td>Theoretical framework</td>
<td>29</td>
</tr>
<tr>
<td>Social Learning Theory</td>
<td>29</td>
</tr>
<tr>
<td>Chapter Title</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Applied Behavior Analysis</td>
<td>32</td>
</tr>
<tr>
<td>Review of Literature</td>
<td>35</td>
</tr>
<tr>
<td>Search Strategy</td>
<td>35</td>
</tr>
<tr>
<td>Inclusion Criteria</td>
<td>37</td>
</tr>
<tr>
<td>Exclusion Criteria</td>
<td>38</td>
</tr>
<tr>
<td>Article Review and Coding</td>
<td>38</td>
</tr>
<tr>
<td>Results of Review</td>
<td>39</td>
</tr>
<tr>
<td>Journal Types</td>
<td>40</td>
</tr>
<tr>
<td>Study Designs</td>
<td>41</td>
</tr>
<tr>
<td>Participant Characteristics/Demographics</td>
<td>42</td>
</tr>
<tr>
<td>Study Location</td>
<td>43</td>
</tr>
<tr>
<td>Persons that Implemented the Intervention</td>
<td>44</td>
</tr>
<tr>
<td>Independent Variables</td>
<td>45</td>
</tr>
<tr>
<td>Dependent Variables/Soft Skills</td>
<td>46</td>
</tr>
<tr>
<td>Participant’s Outcomes from VT</td>
<td>46</td>
</tr>
<tr>
<td>Social Validity</td>
<td>52</td>
</tr>
<tr>
<td>Maintenance and Generalization</td>
<td>52</td>
</tr>
<tr>
<td>Summary of Literature Review</td>
<td>53</td>
</tr>
<tr>
<td>Gaps in Literature</td>
<td>57</td>
</tr>
<tr>
<td>Implications of Findings from Reviewed Literature</td>
<td>59</td>
</tr>
<tr>
<td>Limitations of the Reviewed Literature</td>
<td>61</td>
</tr>
<tr>
<td>Chapter III</td>
<td>64</td>
</tr>
<tr>
<td>Methodology</td>
<td>64</td>
</tr>
<tr>
<td>Overview</td>
<td>64</td>
</tr>
<tr>
<td>Participants</td>
<td>65</td>
</tr>
</tbody>
</table>
Baseline Phase ............................................................................................................. 106

Intervention Phase ........................................................................................................ 108

Follow-up/Maintenance ................................................................................................. 109

Generalization ................................................................................................................ 111

Social Validity .................................................................................................................. 112

Data Analysis .................................................................................................................. 113

Visual Analysis ............................................................................................................... 113

Statistical Analysis .......................................................................................................... 115

Qualitative Analysis ........................................................................................................ 117

Chapter IV ....................................................................................................................... 118

Results .............................................................................................................................. 118

Overview ......................................................................................................................... 118

Participant Performance ................................................................................................. 120

Queen's Performance ...................................................................................................... 122

Baseline ......................................................................................................................... 122

Intervention ...................................................................................................................... 122

Maintenance ..................................................................................................................... 122

Generalization ................................................................................................................ 123

Sarah's Performance ....................................................................................................... 123

Baseline ......................................................................................................................... 123

Intervention ...................................................................................................................... 123

Maintenance ..................................................................................................................... 124

Generalization ................................................................................................................ 124

Homer's Performance ................................................................................................... 124

Baseline ......................................................................................................................... 124
Intervention .................................................................................................................. 124

Maintenance .................................................................................................................. 125

Generalization ................................................................................................................. 125

Sheeza's Performance ..................................................................................................... 125

Baseline ......................................................................................................................... 125

Intervention .................................................................................................................. 126

Maintenance .................................................................................................................. 126

Generalization ................................................................................................................. 126

Consistency of Data Patterns ......................................................................................... 127

Consistency Across Similar Experimental Conditions .................................................. 127

Consistency of the Intervention Effects .......................................................................... 128

Effect Size ...................................................................................................................... 128

Pre- and Post-Intervention Questionnaires .................................................................... 129

Social Validity ................................................................................................................ 132

Participants .................................................................................................................... 132

Observers ....................................................................................................................... 132

Chapter V ....................................................................................................................... 134

Discussion ...................................................................................................................... 134

Overview ......................................................................................................................... 134

Discussion of Findings ................................................................................................... 134

Meaning of Study Results ............................................................................................... 137

Connection to Previous Research .................................................................................. 138

Contrast with Previous Research .................................................................................. 138

Contribution to Self-Determination Literature ................................................................ 141

Contribution to the Use of Technology in Learning ....................................................... 142
Implications of Study Findings .............................................................. 143

Implications for Practitioners ............................................................... 143

Implications for Policy ........................................................................ 145

Future recommendations ..................................................................... 146

Recommendations for Practice ............................................................. 146

Recommendations for Research .......................................................... 147

Recommendations for Policy ............................................................... 149

Limitations of the Study ...................................................................... 150

Variability in Participant Performance ................................................ 150

Internal Validity .................................................................................. 153

External Validity .................................................................................. 153

Measurement Issues ........................................................................... 155

Conclusion ......................................................................................... 157

References ......................................................................................... 161

Appendix A. Inter-observer Agreement Form (IOA) ............................... 199

Appendix B. Research Study Recruitment Letter .................................. 200

Appendix C. Parental Permission Form ................................................ 201

Appendix D. Pre- and Post-Intervention Problem-Solving Questionnaire .................................................. 206

Appendix E. Problem Situation Baseline Measure - Video Assessment ........................................................................ 207

Appendix F. Problem Situation Intervention Measure ................................ 212

Appendix G. Problem Situation Maintenance Measure ................................ 217

Appendix H. Problem-Solving Situation Generalization Measure ............... 222

Appendix I. Sample Problem-Solving Assessment Situations (Used for Reliability of Measurement) ........................................................................ 223

Appendix I. Sample Problem-Solving Assessment Situations (Used for Reliability of Measurement) ........................................................................ 223

xiii
Appendix J. Measures of Social Validity ................................................................. 226
Appendix K. Observer Training Protocols .............................................................. 227
Appendix L. Observer Training Checklist ............................................................ 228
Appendix M. Participant Training Protocols ........................................................... 229
Appendix N. Participant Training Checklist ......................................................... 230
Appendix O. Procedure for Implementing Study/Data Collection Procedure ............. 231
Appendix P. Study Implementation Checklist ....................................................... 233
LIST OF TABLES

Table 1. Summary of Keywords, Search Strings, and Databases..................................................37
Table 2. Summary of Participants Demographics.................................................................43
Table 3. Summary of Study Participants......................................................................................66
Table 4. Content of Video Models for 15 Different Problem Situations....................................75
Table 5. Examples of Intervention Video Modeling Sequence................................................77
Table 6. Summary of IOA across the sessions..........................................................................97
Table 7. Study Timelines and Duration....................................................................................100
Table 8. Summary of Effect Size.............................................................................................129
Table 9. Pre- and Post-Intervention Questionnaires Participant Responses.............................130
LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Concept Circle Diagram representing the Theoretical Framework</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>Flow Diagram Summary of Study Search Procedures</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>A summary Flow Chart of Creating Five Video Models</td>
<td>79</td>
</tr>
<tr>
<td>4</td>
<td>Flow Chart of Procedures of the Current Study</td>
<td>99</td>
</tr>
<tr>
<td>5</td>
<td>Participants' Number of Correct Response across conditions</td>
<td>121</td>
</tr>
</tbody>
</table>
Chapter I

Introduction

Overview

This chapter outlines the challenges individuals with Autism and Intellectual and development disorders face in obtaining and maintaining employment in their communities despite available accountability measures warranted by existing laws. Also discussed are the problem statement, significance of the problem related to the state of employment of individuals with disabilities, and importance of work. Additionally, this chapter outlines the purpose of the proposed study, research questions that guided the study, and a definition of terms.

Background Information

Although post-school outcomes of individuals with autism (ASD) and Intellectual and Developmental Disorders (IDD) continue to improve because of the Individuals with Disabilities Education Act of 2004 (IDEA, 2004) accountability measures, Shattuck et al. (2012) report that poor outcomes persist in their employment compared to peers without disabilities. For example, the National Longitudinal Transition Study (NLTS2) data has continuously demonstrated poor employment outcomes, particularly for individuals with ASD and/or IDD, whereby in the second wave, about 45% of individuals with ASD were identified as employed in comparison to 72% of individuals with other disability types (Newman et al. 2011; Newman et al. 2010). Shattuck et al. (2012) further report that approximately 55% of young adults with ASD and 69% with ID have held paid employment during the first six years after graduating high school—this is a lower rate in comparison to their peers with other disability types including learning disability (94%) and speech/language impairment (86%). According to Shattuck et al. (2012), the risk for unemployment for individuals with ASD is higher in the first two years post-high school graduation as they established that about 50% of individuals with ASD were not employed or did
not participate in any employment-related education. Recently, students with disabilities attending postsecondary transition programs lost a lot of instruction time because of the school shutdowns occasioned by the COVID-19 pandemic. The loss of instruction time has put them at a greater risk of lagging in acquiring necessary skills for their successful transition into employment and may hence lead to poor post-school employment outcomes.

Poor outcomes in the postsecondary employment of individuals diagnosed with ASD and/or IDD might put them at risk of relying on government support services (Cimera, 2009; Järbrink & Knapp, 2001), reducing their cognitive functioning (Garcia-Villamisar & Hughes, 2007), and social interaction opportunities. Further, they may lack meaningful peer relationships, experience a generally reduced quality of life (García-Villamisar et al., 2002; Hillier et al., 2011), and experience increased anxiety and depression (Hillier et al., 2011) because of lack of employment.

Problem Statement

The Individuals with Disabilities Education Act (IDEA; 2004) mandates special education and related services to children and adolescents with disabilities, including ASD and/or IDD, and the need for appropriate outcome-oriented post-secondary transition goals as soon as a student turns 16 or earlier if determined necessary by an Individualized Education Program (IEP) team. IDEA is a piece of federal special education legislation that guides the education services of qualifying individuals with disabilities in the United States of America (U.S.A). The law (IDEA) mandates free and appropriate public education (FAPE) in the least restrictive environment, individualized education programs, non-discriminatory evaluations, parental involvement, and procedural safeguards. Additionally, according to IDEA (2004), one of the primary purposes of FAPE is to prepare a transition-aged individual with a disability for
employment. Therefore, this dissertation study focuses on establishing viable solutions to preparing individuals with ASD and/or IDD for post-secondary jobs in line with IDEA requirements.

Since IDEA’s 2004 reauthorization, there has been an increase in post-secondary transition rates partly because of expanded accountability measures bequeathed to states in the form of IDEA’s 20 Indicators. Indicators are measures of compliance and effectiveness of an individual state’s implementation of the Individuals with Disabilities Education Act (IDEA), Part B. Indicators 13 and 14 are in place to support the transition outcomes of students with disabilities into postsecondary education, independent living, and employment. For example, Indicator 13 requires states to report the percent of youth annually with IEPs aged 16 and over whose IEP includes appropriate measurable postsecondary goals that are annually updated based upon age-appropriate transition assessment [20 U.S.C. 1416(a)(3)(B)]. Indicator 14, on the other hand, requires states to report the percentage of youth who are no longer in secondary school yet had IEPs in effect when they left school and were either enrolled in higher education within one year of leaving high school, competitively employed or live independently [20 U.S.C. 1416(a)(3)(B)]. Therefore, preparing for employment while still in school by following realistic transition goals and obtaining post-school employment is an accountability outcome measure requirement by IDEA (2004).

Despite these accountability measures, individuals with ASD and/or IDD still face challenges obtaining and maintaining competitive integrated employment opportunities because of soft skill incompetence (Agran et al., 2016; Hendricks, 2010; Lindsay et al., 2014). Soft skills are skills related to attitude, cooperation, reliability, productivity, quality of work, teamwork, and communication (Clark et al., 2019). They are intrapersonal (within self) and interpersonal
(between self and others, e.g., developing rapport) work skills that facilitate the application of technical skills and knowledge (Morningstar et al., 2017; Leigh et al., 1999). They are skillsets not directly connected to specific job tasks; however, they are necessary for satisfying the requirements of a job position because they involve relationships with other people in the organization that manifests in the ability to collaborate (Cimatti, 2016). Furthermore, Leigh et al. (1999) identify workplace competencies such as problem-solving, communication skills, personal qualities, work ethic, interpersonal skills, and teamwork as soft skills. Soft skill needs for individuals with ASD and/or IDD may manifest in the areas of mastering the job application process, interviewing for jobs, remembering job tasks, following instructions, interacting and communicating effectively with co-workers, and integrating into the workplace culture (Baldwin et al., 2014; Hedley et al., 2018; Dreaver et al., 2020; Krieger et al., 2012; Müller et al., 2003).

The challenges of obtaining and maintaining competitive integrated employment opportunities for individuals with ASD and or IDD who struggle with soft skills may have worsened following the loss of instruction time during the COVID-19 pandemic in 2020 if we consider insights from the various existing studies that have reported learning loss due to out of school-times (Goodman, 2014; Liu et al., 2020; Quinn & Polikoff, 2017) for varied student populations. Hence, practitioners and researchers must develop creative solutions to fulfill IDEA accountability measures requiring increased transition rates into competitive employment. One such innovative solution may involve using video technology (VT) to teach soft skills for employment in a virtual learning platform. According to Wehman et al. (2016), researchers and practitioners can fulfill VT's use to teach soft skills necessary for competitive employment to individuals with ASD and/or IDD by engaging them in intensive vocational instructions before entering the workforce and training them onsite once they obtain competitive employment.
Significance of the Problem

Preparing individuals with disabilities for competitive employment while still in school by following realistic transition goals and obtaining post-school employment is an accountability outcome measure requirement by IDEA (2004) (Oliech & Oshokoya, 2021). Despite these accountability measures that have ensured increased graduation rates for individuals with disabilities, the differences in competitive employment outcomes for individuals with ASD and/or IDD have been distinct from their peers with other disability diagnoses and peers without disabilities (Baldwin et al., 2014; Howlin et al., 2004; Shattuck et al., 2012; Taylor et al., 2015). This study should help equip individuals with ASD and/or IDD with the soft skills necessary to obtain and maintain competitive employment in their community post-secondary graduation. The study also aims to help close the employment gap between individuals with ASD and/or IDD diagnosis and their non-disabled peers and help improve transition outcomes, thereby fulfilling IDEA accountability measures while providing a foundation for future access to the transition program curriculum in a virtual learning environment using video technology (VT).

State of Employment of Individuals with a Disability

Data from the Bureau of Labor Statistics, U.S. Department of Labor shows that the unemployment status for individuals with disabilities is significantly higher than their peers without disabilities. Recent data demonstrates that 80.7% of individuals with a disability are unemployed, compared to 33.7% of individuals without a disability (Bureau of Labor Statistics, 2019), and these differences are stark for individuals with ASD and/or IDD due to challenges with soft skills, which may bar them from obtaining and retaining competitive employment like their peers without disabilities upon graduation. Other reports across the literature depict the imbalance in unemployment over the years since Congress reauthorized IDEA (2004) with more
accountability measure requirements. For example, Newman et al. (2009), in an analysis of National Longitudinal Transition Study-2 (NLTS-2) data, observed that youths with disabilities are less likely to work (57% vs. 66%) once they complete secondary school compared to their peers without disabilities. The disparity in employment outcomes is alarming among individuals with ASD and/or IDD. For instance, while approximately 50,000 individuals with ASD turn 18 years old each year and transition into adult-based services, Shattuck et al. (2012), in a national survey, report that they are at a higher risk than adults with other disabilities for no participation in employment two years following their graduation from high school.

Moreover, adults with ASD and co-occurring intellectual disabilities (ID) are still underrepresented in employment compared to the general population (Taylor et al., 2015). Additionally, individuals with ASD with co-occurring ID are at a greater risk for unemployment than adults with ASD with average IQ (i.e., about 98) scores (Holwerda et al., 2012). Existing literature is replete with reports of high unemployment and underemployment rates of individuals with ASD and/or IDD (Baldwin et al., 2014; Howlin et al., 2004; Shattuck et al., 2012; Taylor et al., 2015; Wehman et al., 2020). Adults with ASD who are fortunate enough to get into employment involuntarily work fewer hours and earn less than their peers without disabilities (Wilczynski et al., 2013), indicating underemployment.

These disparities could also worsen following the loss of valuable instruction time for individuals with disabilities in transition programs targeting employment during the COVID-19 pandemic in 2020 if we are to consider insights from previous studies that have consistently reported learning loss due to out-of-school times (Quinn & Polikoff, 2017; Goodman, 2014; Liu et al., 2020). The likely future deterioration in the unemployment situation due to the COVID-19 pandemic is evident from a recent special report by the Kessler Foundation and the University of
New Hampshire nTIDE titled Workers with Disabilities in the COVID Economy. They report that from March to April 2020, the number of employed working-age people with disabilities fell by 20 percent (950,000 people), while the number of employed working-age people without disabilities decreased by 14 percent. These unemployment trends are worrying since they may have societal implications beyond the financial well-being and independence of individuals with disabilities, especially those diagnosed with ASD and/or IDD, as discussed under the importance of work in the section below. Additionally, with the COVID-19 pandemic still ongoing, the gains that have so far been made in transition rates to employment amongst these individuals with ASD and/or IDD over the years are also at risk of being rolled back, considering lost instruction times in post-secondary transition programs during this period of self-isolation, quarantining, and virtual learning.

Due to the impact of the pandemic on students with disabilities (Zhang et al., 2020), educators and practitioners must be creative by working to eliminate all imaginable constraints (Yamamoto & Karaman, 2011) to learning and employment, including the most novel ones occasioned by the COVID-19 pandemic, by adopting technology to improve education and employment outcomes for individuals with disabilities, thereby fulfilling IDEA accountability measures. Most specifically, teachers and practitioners should be creative in providing remote (virtual) transition services to individuals diagnosed with ASD and/or IDD while using technology to improve the transition into employment outcomes in the future, as is the IDEA (2004) Indicator’s expectation.
**Importance of Work**

Work is pivotal in the lives of individuals diagnosed with ASD and/or IDD as it is the foundation for meeting human needs, including survival and power, social connection and self-determination, and well-being (Blustein, 2008). Work also provides opportunities to advance social support systems, self-expression opportunities, and self-determination - essential components of psychological health (Blustein, 2008). Through work, individuals with ASD and/or IDD can gain good financial standing and improve their self-esteem and mental health (Blustein, 2008). Specifically for individuals with ASD, some of the documented positive outcomes associated with employment across literature include increased cognitive functioning, improved social interaction opportunities, development of peer relationships, a general improvement in the quality of life, and reduced anxiety and depression (García-Villamisar & Hughes, 2007; García-Villamisar et al., 2002; Hillier et al., 2011).

Moreover, employing individuals with ASD and/or IDD in competitive positions is likely to lead to significant and broad economic benefits (Buescher et al., 2014; Knapp et al., 2009). Because through employment, individuals with ASD and/or IDD can gain financial independence, self-fulfillment, and self-confidence (Hedley et al., 2018; Jahoda et al., 2009), all of which may benefit the society and communities they live. With the acquisition of jobs, the reliance of individuals with ASD and/or IDD on government support programs (e.g., Social Security Disability Insurance Program) might reduce while paying taxes and contributing to the economy (Cimera, 2009; Järbrink & Knapp, 2001). After acquiring a job, the reduced reliance on government support programs is critical because the national cost of unemployment of individuals with ASD and/or IDD is expensive (Knapp et al., 2009). For example, the Social Security Administration accounts that as of December 2020, about 8,151,016 workers with
disabilities, 3.9% of whom had ID, received support through the Social Security Disability Insurance Program (Social Security Administration, 2021). The average monthly benefits in dollars paid across all age groups in 2020 were approximately $1,277.05 per qualifying individual with a disability without a job (Social Security Administration, 2021). It is, therefore, clear that with unemployment, the government may not only pay qualifying individuals with ASD and/or IDD for unemployment, but these individuals might also not pay taxes.

Despite the outlined benefits of employment for individuals with ASD and/or IDD, they still struggle to obtain and maintain competitive jobs in their communities. One of the several reasons for poor employment outcomes amongst this group is challenges with soft skills essential to obtaining and maintaining competitive employment (Agran et al., 2016; Lindsay et al., 2014). Educators and researchers should thus endeavor to seek ways of creating competitive employment opportunities for individuals with ASD and/or IDD because, despite the already identified benefits, their employment might also positively impact their health and well-being (Chen et al., 2015; Creed & Macintyre, 2001; Feather & O’Brien, 1986). One of the many ways stakeholders can increase employment opportunities for individuals with ASD and/or IDD to profit from the outlined benefits of working is through VT to support their unique needs, including soft skills in competitive employment settings. Also, by utilizing VT to teach soft skills necessary for employment to transition-aged individuals with ASD and/or IDD in a virtual learning environment to ensure continuity in learning during a pandemic that has interfered with school programs.

**Purpose Statement**

Therefore, this study aims to determine the effectiveness of using video modeling (VM) to teach problem-solving skills procedures as a soft skill for employment to transition-aged
individuals with a diagnosis of ASD and/or IDD in a virtual learning platform. This need arises from the ongoing COVID-19 pandemic, which has resulted in school closures and student absenteeism due to sickness, leading to lost instruction time in postsecondary transition programs for students with ASD and/or IDD. The school closures, absenteeism, and lost instruction times necessitated the Department of Education (DOE) clarification that ensuring compliance with the Individuals with Disabilities Education Act (IDEA), Section 504 of the Rehabilitation Act (Section 504), and Title II of the Americans with Disabilities Act should not prevent any school from offering educational programs through distance instruction (United States Department of Education, 2020). Practitioners, therefore, have the consent to utilize the existing technology in creative ways to promote virtual access to learning without breaching the requirements of the current special education laws. One of the creative ways for using the existing technologies is by conducting teaching in online environments while integrating evidence-based interventions like video modeling, which can be easily unified into existing open-access online platforms (like Zoom, Nearpod, Google Classrooms, etc.) to prepare students with ASD and/or IDD for post-school employment opportunities.

**Research Questions**

This study sought to answer the following research questions (a) Can practitioners effectively use a video modeling (VM) intervention in a virtual learning platform to teach problem-solving skills procedures as a soft skill for competitive employment to transition-aged individuals diagnosed with ASD and/or IDD? (b) Can students with ASD and/or IDD use the learned problem-solving skills procedures to solve novel problems after the researcher withdraws the video modeling (VM) intervention in a virtual learning environment? (c) Can students with ASD and/or IDD generalize the use of problem-solving skills procedures in novel settings? (d)
Can the use of VM interventions to teach problem-solving skills procedures in a virtual learning environment have desirable effects on student and teacher perceptions?

**Definition of Terms**

**Soft Skills**

*Soft skills* are “desirable qualities for certain forms of employment that do not depend on acquired knowledge” (“Soft Skills”, 2019).

**Problem-Solving Skills**

Problem-solving is a multiple-step process that identifies a problem and its possible solutions, decides on different actions, and then chooses the best solution for the problem (D’Zurilla & Goldfried, 1971). According to Mayer (1992), during problem-solving, the problem solver must find relationships between past experiences (schema) and the problem at hand and then act upon a solution.

**Video Technology**

Reed et al. (2011) define *video technology* as using an electronic or mechanical apparatus that the practitioner can program to automatically deliver visual, auditory, or proprioceptive cues, discriminative stimuli, or display the modeling of desired behaviors. This study explores how practitioners and teachers can use visual and auditory stimuli delivered on an electronic device on a virtual learning environment platform to demonstrate modeling and teaching of desired problem-solving skills as a soft skill for competitive employment of individuals diagnosed with ASD and/or IDD.
**Video Modeling (VM)**

VM is a method of teaching that involves using video recording and display equipment to provide a visual model of the targeted behavior or skill to a learner before performing the same behavior or its variation immediately or later (Rayner et al., 2009).

**Traditional or Basic VM**

A type of VM that involves recording an individual other than the learner engaging in the target behavior. The learner will then view the model performing the target behavior later, then imitate all the steps in the video after viewing (Rayner et al., 2009). Basic VM is suitable for teaching learners with a skill set to attend to one-minute and longer videos.

**Video Self-Modeling**

Video self-modeling is a variation of basic VM in which the learner sees themselves on a videotape while performing a skill correctly before they perform the same skill or its variation independently (Dowrick, 1986).

**Peer-Mediated VM**

A type of VM that allows a peer with an advanced functional level of performance to act as a model in the video that a learner will watch (Buggey & Ogle, 2012).

**Point-Of-View VM**

A type of VM whereby a target behavior or skill is recorded from a learner’s perspective—the learner will then watch the modeled behavior or task before performing the task independently (Sancho et al., 2010).

**Video Prompting**

A type of VM whereby tasks are broken into steps then recorded with pauses incorporated in between the steps so that a learner may view then attempt a modeled step before they attempt the subsequent steps independently (Cannella-Malone et al., 2011).
Video Priming

A type of VM whereby a learner is exposed in advance to a situation that may alter their behavior or thoughts. Video priming is best for teaching tasks that a learner has already mastered by manipulating the antecedent events or the establishing operations (Schreibman et al., 2000).

Video Feedback

It involves filming an individual while performing a task or skill, then watching a video recording of themselves performing the tasks later and answering questions about their performance (Fukkink, 2008).

Virtual Reality

Virtual reality involves presenting a simulation of the natural world (i.e., virtual environments) based on computer graphics so that the learner can acquire essential skills or behavior that they can transfer to new natural environments (Bellani et al., 2011).

Mixed Reality

Involves presenting an individual with an experience that merges both the real and simulated environment to learn essential skills or behavior that may be important for them to function in their environment. In mixed reality, there is an intersection of digital and physical experiences.

Transition Age

An individual with a disability aged 16 years and above that receives educational services under IDEA and has a transition plan that outlines postsecondary education, employment, and independent living goals (IDEA, 2004). Transition age in Pennsylvania begins at the age of 14 years old.
**Virtual Learning**

Type of learning whereby education content and instruction are delivered primarily over the Internet (Greer et al., 2014). Virtual learning is synonymous with fully online, cyber, remote, or e-learning.

**Competitive Employment**

The Workforce Innovation and Opportunities Act defines competitive employment as full-time or part-time employment where individuals with a disability work in their community while earning at least state or local minimum wages, with an opportunity for advancement similar to other workers without disabilities in the same position [34 C.F.R. §361.5(c)(9)(i-iii)(2018)].

**Autism**

A spectrum of disorders characterized by qualitative impairments in social interaction, qualitative impairments in communication, restricted, repetitive, and stereotyped behavior patterns, interests, and activities (5th ed.; DSM-5; American Psychiatric Association, 2013), also referred to as autism spectrum disorders (ASD) in this paper.

**Intellectual Disability**

Intellectual Disability (ID) is a developmental condition characterized by significant deficits in both intellectual functioning and adaptive behavior, including conceptual, social, and practical skills (5th ed.; DSM-5; American Psychiatric Association, 2013).

**Intellectual and Developmental Disabilities**

A situation in which ID and other disabilities (e.g., ASD, Down syndrome, cerebral palsy, etc.) are present in an individual.
College Readiness

Being academically prepared for postsecondary education, as measured through standardized test scores, course completion, and grade point average (An & Taylor, 2015).

Career Readiness

An individual with a disability is said to be career-ready when they possess skills presumed necessary for future workforce success (An & Taylor, 2015).

Reactivity

A situation in which a participant temporarily alters their behavior because they are aware that the researcher or someone else they are not familiar with is in the environment to observe their behavior during an ongoing assessment (Kazdin, 1982).

System of Least Prompts

Giving a participant a chance to independently click the blue submit button on Nearpod after typing their response using a keyboard or speaking into the onscreen microphone, which will transcribe their response to text before providing them with the least intrusive level of assistance from a hierarchy until they can submit their answer by clicking on the blue submit button (Snell & Brown, 2011; Spooner et al., 2011).

Missing Material

A prearranged work situation in which one or more of the necessary items needed to accomplish a job task is lacking. For example, the stapler is not available when asked to staple papers.

Broken Material

A prearranged work situation in which one of the items required for accomplishing an assigned job task is damaged (not functional) so that the participant cannot perform a specific job task without fixing it. For example, when asked to staple papers while the stapler is in pieces.
**Mismatched Material**

A prearranged work situation in which one of the items required for accomplishing an assigned job task is incompatible so that the participant cannot continue to work without fixing it by finding the compatible matching item. For example, when asked to staple papers yet the staple pins available are different sizes from the correct ones, they cannot bind the paper tightly or fit into the stapler.

**Partially Complete/Incomplete Material**

Refers to a prearranged work activity whereby some items in a list of job tasks a participant should perform have been half-finished by happenstance. For example, when a job coach asks a participant to print twenty labels for mailing, yet about twelve had already been printed. Alternatively, a prearranged work situation in which someone had already started working on a job task that a job coach has assigned to a participant, but they did not complete it. For example, when asked to arrange 50 envelopes in an out tray, yet a co-worker had placed 25 envelopes in the out tray.

**Complete Material**

A prearranged work situation in which a worker has previously fulfilled all the components of the job task that the job coach asks a participant to undertake. In this case, the participant does not need to take any action to fulfill the directions given by the job coach. For example, when a job coach asks the participant to staple papers on his desk, but the participant or someone else has already stapled the papers.

**Discrete Trial**

Discrete trials are behaviors that occur within a limited or restricted problem situation, e.g., responding to a question prompted by a supervisor or responding to questions in the video assessments outlined in this study (Cooper et al., 2020).
**Practice Effects**

Practice effects refer to improvements in participant performance that may result from the repeated presentation of similar modeled behavior per session in a video scenario (Cooper et al., 2020).

**Behavior Skills Training**

A training package that utilizes instructions, modeling (e.g., video modeling), rehearsal, and feedback (e.g., video feedback) to teach a new skill until a predetermined criterion is reached (Dib & Sturmey, 2012).

**Multicomponent Intervention**

Also referred to as multi-video intervention designs in this study is a strategy that combines two or more intervention approaches (e.g., video technology like video modeling and reinforcement strategies, or video modeling and video feedback, etc.).

**Functional Relationship**

A functional relationship exists when a systematic manipulation of an independent variable (e.g., VT) changes a dependent variable (e.g., rate of performance of a targeted soft skill) by either increasing or decreasing it predictably.

**Post-Secondary Education Transition Program/ Comprehensive Transition Program**

A post-high school education program offered to transition-aged students with qualifying disabilities under IDEA (e.g., ASD and IDD) who graduate from high school by “banking” their diploma before reaching 21 years old to continue receiving services under IDEA. Students in post-secondary education programs learn important skills to get into jobs, college, or live independently in their communities.
Chapter II

Literature Review

Overview

In this chapter, the researcher presents an updated literature review about using video technology (VT) to teach soft skills for employment to transition-aged individuals with autism (ASD) and intellectual and developmental disabilities (IDD) from an earlier study (Oliech & Oshokoya, 2021). The chapter outlines a detailed description of the method used in systematically reviewing the literature, a description of the results, and a discussion of findings.

Autism, Intellectual, and Developmental Disabilities

Autism is a spectrum of disorders characterized by qualitative impairments in social interaction, qualitative impairments in communication, restricted, repetitive, and stereotyped behavior patterns, interests, and activities (5th ed.; DSM-5; American Psychiatric Association, 2013). Intellectual disability is a developmental condition characterized by significant deficits in both intellectual functioning and adaptive behavior, including conceptual, social, and practical skills (5th ed.; DSM-5; American Psychiatric Association, 2013). On the other hand, according to the American Association on Intellectual and Developmental Disabilities (AAIDD; n.d.), IDD is a term often used to describe a situation in which ID and other disabilities (e.g., ASD, Down syndrome, cerebral palsy, etc.) are present in an individual. ASD commonly co-exists with Intellectual Disability (ID) (Fombonne et al., 1997; Gillberg, 1999), and individuals with ASD and IDD often exhibit co-occurring characteristics (Lecavalier et al., 2011). This possible coexistence between ASD and ID makes them share similarities that also informed the choice of participants in this study (i.e., participants with either ASD and/or IDD).
Common soft skills are needed with individuals with ASD and/or IDD as they have been known to experience difficulties in soft skills in the area of mastering the job application process, interviewing, remembering, and following instructions, interacting and communicating effectively with co-workers, and integrating into the workplace culture (Baldwin et al., 2014; Krieger et al., 2012; Müller et al., 2003). Also, individuals with ASD report social anxiety (Maddox & White, 2015), limiting their ability to employ soft skills in job-seeking activities, including interviewing successfully. In addition, differences in soft skills may also manifest in difficulty recognizing and responding to nonverbal cues and communication (Adolphs et al., 2001; Castelli, 2005). Moreover, individuals with ASD and/or IDD also experience difficulties in executive functioning skills (Leung & Zakzanis, 2014), translating to difficulty acquiring and generalizing soft skills. Some of the challenges in executive functioning skills that they may experience, thereby translating into soft skill difficulties, include cognitive flexibility (i.e., the ability to switch between thinking about different concepts), inhibitory control (i.e., the ability to inhibit irrelevant information), response inhibition (i.e., the ability to inhibit behaviors), working memory (i.e., the ability to store and manipulate information), and higher-order planning ability (i.e., monitoring and evaluating sequential actions towards a goal) (Jones et al., 2018; Miyake & Friedman, 2012).

These unique characteristics of individuals with ASD and/or IDD have made it difficult for individuals with their diagnoses to successfully obtain and maintain traditional competitive jobs in their communities (Newman et al., 2011). Studies show that behavioral attributes of individuals with ASD and/or IDD associated with differences in social skills and cognition are associated with poor employment outcomes and low quality of life outcomes (Howlin et al., 2004; Marriage et al., 2009). Competitive work environments also present challenging social
dynamics, varied communication requirements, and the need for flexibility, all of which require adept soft skills to navigate hence solidifying the need to not only make available appropriate adaptations and accommodations but also to teach these individuals with ASD and/or IDD proper ways to cope with the increased demand for soft skills in their work environment. Exploring VT’s use to teach and make appropriate accommodations and supports for soft skills acquisition is consistent with and fulfills Richards's (2012) recommendations of making available appropriate support to the challenges presented by ASD and/or IDD in finding and maintaining meaningful employment.

Given the fluid nature of the current COVID-19 situation, it is vital to acknowledge that the challenges presented by ASD and/or IDD diagnosis amongst transition-aged students might be twofold: (1) The need to learn appropriate soft skills to fit in a virtual work or school environment during and potentially after, a pandemic when virtual learning and work may still be available as an option. (2) The need for practitioners to continue offering appropriate education to individuals with ASD and/or IDD as per IDEA stipulations and the DOE regulations during the pandemic (United States Department of Education, 2020).

Despite these challenges, VT’s use with individuals with ASD and/or IDD may be suitable because their specific characteristics align more with VT interventions than other learning interventions. For example, some of the attributes of individuals with ASD and/or IDD specified by Corbett and Abdullah (2005) as contributing to the benefits of using VT include: having over-selective attention, which can make other techniques distracting; having a restricted field of focus, which can make “zoning in” on videos preferable; having a preference for visual stimuli and visually cued instruction; avoidance of face-to-face interactions, but lack of a similar response to people on video; and ability to process visual information more readily than verbal
information. Additionally, the need to pursue the use of technology in teaching soft skills to individuals with ASD and/or IDD is supported by Burke et al. (2021) observation that social and communication differences associated with ASD may make conventional instruction approaches to job training, such as extensive verbal directives counterproductive in teaching the skills required for successful employment.

**Video Technology**

This chapter explores the literature about how researchers and practitioners have used video technology (VT) as a choice for teaching soft skills. Researchers have shown that interventions that utilize technology positively affect skills, such as social, communication, facial recognition, functional, and safety skills, of students with ASD (Grynszpan et al., 2014). They have also demonstrated that instructional interventions that employ visual stimuli delivered via electronic media to help individuals with ASD understand and practice social situations have proven engaging and effective (Mineo et al., 2009; Reed et al., 2011). Additionally, Walsh et al. (2017), in a systematic review of employment literature about technology-aided interventions for employment skills in adults with ASD, identified VT, specifically video modeling (VM), as one of the most used interventions in adults with ASD with positive outcomes reported in all but one study.

VT use is ubiquitous, making it a suitable choice to explore how it can benefit individuals with ASD and/or IDD diagnosis in acquiring soft skills for work, especially during and after the COVID-19 pandemic when learning might primarily be hybrid (i.e., virtual or in-person, depending on circumstance). When extensively established, VT’s use may further fill the divide of access to learning and unemployment between individuals with ASD and/or IDD and their peers without disabilities, as seen in the data described earlier because studies report the use of
VT as effective in teaching a variety of vocational and adaptive daily living skills (hard skills) like cleaning (Wu et al., 2016), and preparing food (Johnson et al., 2013).

Using VT to support soft skills acquisition amongst individuals with ASD and/or IDD is expedient, considering studies that show these individuals to have an affinity for screen-based media, including computers, television, video games, and social media (Mazurek et al., 2012; Ward et al., 2018). VT is also suitable because of its ability to be formatted by breaking down tasks into small, manageable steps. This ability to break down tasks helps reduce the cognitive load on an individual with ASD or IDD, minimizing the effort one must put into remembering the next step of the task (Park et al., 2019).

Some of the VT interventions applied to individuals with disabilities across the literature include video modeling, video feedback, virtual reality, and mixed reality, all defined above (see Chapter One) and discussed briefly in the following sections. Video modeling, however, is the most common type of VT used with individuals with ASD and/or IDD and the one that meets evidence-based practice (EBP) criteria with single-subject studies (Wang & Spillane, 2009; Bellini & Akullian, 2007).

**Video Modeling.** Video modeling (VM) is an EBP (Bellini & Akullian, 2007; Wang & Spillane, 2009) where an individual learns a desired skill by watching a video of a model (peer, sibling, or parent) completing a skill correctly before they do it themselves. VM interventions are predicated on Bandura’s social learning theory (Bandura, 1969b), whereby individuals are believed to learn skills through observation and vicarious reinforcement (Bandura, 1969b) and on Applied Behavior Analysis (ABA) principles, which capitalizes on the visual processing strength of individuals with ASD (Burke et al., 2013). Although common for its use among children with ASD (Ayres & Langone, 2005; Bellini & Akullian, 2007; Quill, 1997) and adults
with developmental disabilities (Cannella-Malone et al., 2006; Goodson et al., 2007), VM is the most widely adopted form of VT to date with studies reporting the use of VM as effective in teaching a variety of vocational tasks (Allen et al., 2010; Kellems & Morningstar, 2012) like sorting mails (Alexander et al., 2013) and adaptive daily living skills (hard skills) like washing dishes (Cannella-Malone et al., 2011; Gardner & Wolfe, 2015), cleaning (Aldi et al., 2016), and preparing food (Aldi et al., 2016; Sigafoos et al., 2005) to transition-age individuals with ASD and/or IDD. There are different variations of VM, including traditional or basic VM, video self-modeling, peer-mediated VM, point-of-view VM, video prompting, and video priming, all of which are defined and described in Chapter One under “definition of terms” above.

Despite the established wide use of different types of VM in teaching hard skills like washing dishes (Cannella-Malone et al., 2011; Gardner & Wolfe, 2015), cleaning (Aldi et al., 2016), preparing food (Aldi et al., 2016; Sigafoos et al., 2005, etc.), little is known about its use to teach soft skills necessary for employment in a virtual environment. Adopting it to teach soft skills in a virtual learning environment to fulfill transition goals during a pandemic might create and enhance competitive employment opportunities for individuals with ASD and/or IDD while fulfilling IDEA (2004) accountability measure requirements. Therefore, it is necessary to investigate the effectiveness of using VM in a virtual learning environment to teach problem-solving skills as a soft skill for competitive employment to individuals with autism and intellectual and developmental disabilities.

**Brief Overview of Legislation**

Transition practitioners should use technology equitably to support teaching and learning and use it as a change agent and a central force in economic competitiveness and accessibility (Culp et al., 2005). This need for equitable use of technology is supported in extant legislation,
reflecting the importance of using technology to provide accommodations and enhance accessibility to individuals with disabilities. Today, some specific legislation guides the use of technology as a pathway for instruction and accessibility amongst individuals with disabilities. These legislations support the provision of accommodations and adaptations to individuals with ASD and/or IDD in work or school environments. The legislations include Section 504 of the Rehabilitation Act (1973), the Americans with Disabilities Act (ADA; 1990), the Every Student Succeeds Act (2015), the Individuals with Disabilities Education Act (IDEA; 2004), and the Assistive Technology Act (2004), all discussed briefly in the following sections.

**Section 504 and Americans with Disabilities Act (1990).** Section 504 of the Rehabilitation Act (1973) requires the provision of adaptations and accommodations to individuals with a diagnosed disability that affects any primary life function. The Americans with Disabilities Act (1990) (ADA) also stipulates that government and private business entities must provide reasonable accommodations to individuals with disabilities to make communities more accessible. These two laws require educational institutions and employers to make reasonable accommodations for students and employees with disabilities and prohibit discrimination based on disability. The adaptations and accommodations may include using VT in a virtual learning environment to support individuals with ASD and/or IDD’s learning needs. Using VT for accessing education may help them obtain, maintain, and succeed in their future work environments given their social and communication differences (5th ed.; DSM-5; American Psychiatric Association, 2013). These differences may cause them to struggle with soft skills necessary to apply to jobs, integrate into the position, sustain, and maintain the job within their communities.
Every Student Succeeds Act (2015). This legislation provides an added layer of accountability to the education of transition-aged students in K-12 programs with disabilities by mandating state standards aligned to college and career readiness (CCR). Every Student Succeeds Act (ESSA, 2015) requires every state to adopt college and career-aligned standards (Duff & Wohlstetter, 2019). ESSA (2015) also requires states to create accountability indicators addressing such factors as academic achievement, graduation, and a school quality or student success component. In addition, this legislation repeatedly references how vital technology is as an important source of support for teaching and learning across the curriculum. It also recommends that all students be technologically literate by the eighth grade.

Individuals with Disabilities Education Act (IDEA; 2004). This law mandates free and appropriate public education in the least restrictive environment, individualized education programs (IEP), non-discriminatory evaluations, parental involvement, and procedural safeguards. IDEA (2004) requires that IEPs delineate accommodations for testing and accessibility so that individual students can receive appropriate education in the least restrictive environment (Salend, 2008). The accommodations requirements within an IEP, as dictated by the IDEA (2004), align with the need for technology (e.g., video modeling) to support teaching and learning by individuals with ASD and/or IDD. This study also supplements IDEA's (2004) accountability measures discussed above in the form of Indicators 13 and 14.

Assistive Technology Act (2004). The Assistive Technology Act (2004) requires states to give direct aid to individuals with disabilities to access the technology they need to access and participate fully in their communities in education, employment, and independent daily living for success. Thus, researchers, educators, and employers need to use such opportunities supported by existing laws to utilize VT interventions, adaptations, and accommodations to help individuals
with ASD and/or IDD access education and obtain and maintain competitive employment in their communities.

This study aims to capitalize on the outlined provisions of the existing laws to utilize VT to teach problem-solving as a soft skill essential for competitive employment to transition-aged individuals with ASD and/or IDD in a virtual learning environment to increase accessibility to learning during the COVID-19 pandemic.

**Soft Skills**

The Collins English Dictionary (2019) defines *soft skills* as desirable qualities for certain forms of employment that do not depend on acquired knowledge. The skills may include common sense, working with people, and having a positive, flexible attitude. Teaching soft skills as a requisite skill for individuals with ASD and/or IDD seeking to obtain and maintain competitive employment is valuable because employers and organizations are known to seek them widely (Lindsay et al., 2014). They are widely applicable to various jobs and complement the “hard skills” an individual has. However, amongst individuals with ASD, soft skill differences (e.g., remembering and following directions, interacting and communicating effectively with co-workers, and integrating into the workplace culture; Baldwin et al., 2014; Dreaver et al., 2020; Hedley et al., 2018; Krieger et al., 2012, etc.) pose challenges in the competitive work environment and may lead to job termination, underemployment, and unemployment (Hendricks, 2010; Scott et al., 2017). Furthermore, differences in soft skills like communication can negatively affect employers during recruitment. As a result, an employer may exclude an individual with poor soft skills from a competitive position despite being a graduate with adequate technical skills (Pauw et al., 2006).
Literature exists about the need to equip individuals with disabilities with soft skills to enhance their employment outcomes (Agran et al., 2016; Hendricks & Wehman, 2009; Lee & Cater, 2012; Robles, 2012). A study by Klaus (2010) shows how much more difficult it could be for individuals with ASD and/or IDD to acquire a job, given their difficulty in social cognitive skills, which translates to soft skills difference. Klaus (2010) reports that 75% of long-term job success depends on people skills (i.e., soft skills), while only 25% depends on technical knowledge. Therefore, stakeholders must support these individuals in developing the soft skills necessary for employment. Hendricks and Wehman (2009) similarly called attention to the need to advocate for learning specific work-related skills, especially interpersonal skills (soft skills), to promote the transition to work among youth with ASD.

On the other hand, Lee and Carter (2012) identify instruction in work-related social skills (soft skills) as one of seven critical components for effective transition for individuals with ASD. Overall, it is evident that the American economy continues to become more service-oriented (i.e., jobs focused on anticipating, recognizing, and meeting peoples' needs), and with this shift, many individuals with ASD and/or IDD are increasingly seeking predominantly social employment opportunities (U.S. Bureau of Labor Statistics, 2017). These competitive job positions require more adept social and problem-solving skills and, as a consequence, preparing individuals with ASD and or IDD for jobs requiring interaction with others by equipping them with necessary soft skills repertoire is critical at this age of IDEA when accountability measures are in place to support the transition to employment amongst individuals with disabilities.
Importance of Problem-Solving Skills

Teaching problem-solving skills is a quotidian undertaking in a traditional classroom environment because it is crucial in promoting and enhancing self-determination amongst students with disabilities (Wehmeyer, Agran, et al., 2000). However, teaching transition-aged individuals with ASD and/or IDD problem-solving skills as a soft skill for employment in a virtual learning environment is a novel undertaking. Foshay and Kirkley (2003) report that in teaching problem-solving, instructors have primarily focused on teaching about well-structured problem-solving procedures (e.g., cooking using a recipe book, folding laundry, etc.) while failing to identify and teach moderately to poorly structured problem-solving (loose teaching). According to Foshay and Kirkley (2003), this teaching method may lead learners with ASD and/or IDD to perform many small routine job tasks, but they cannot respond when conditions change, or a novel problem situation arises. The lack of ability or skills to solve moderately to poorly structured problems may restrict them to non-competitive employment.

Teaching problem-solving skills to individuals with ASD and/or IDD is vital because they often experience difficulty comprehending abstract or complex demands (Alderson-Day & McGonigle-Chalmers, 2011) and connecting past experiences with the present and future actions (i.e., generalization of skills). They also frequently struggle with soft skills, including problem-solving (Tsatsanis, 2005; Wehmeyer & Kelchner, 1994), limiting their chances of maintaining employment. Teaching and acquiring problem-solving ability may perhaps lay the foundation for all other learning (Peterson, 1996a; Palmer & Wehmeyer, 2002) that can be useful in a work environment throughout an individual with a disability’s life. In addition, acquiring problem-solving skills may enhance employment opportunities, facilitate the development of self-
determination (Cote, 2011; Wehmeyer, Agran, et al., 2000) and increase an individual with ASD or IDD’s opportunity for self-advocacy (Cote, 2011).

There is research to demonstrate that individuals with ASD and/or IDD can learn to solve problems in a variety of situations (Agran & Hughes, 1997; Agran, Madison, & Bown, 1995; Agran & Wehmeyer, 1999; Hughes & Rusch, 1989; Morgan & Salzburg, 1992; Yakubova & Zaleke, 2016). However, teaching problem-solving skills using video technology in a virtual learning environment is a unique undertaking that aims to add to the existing literature on problem-solving as a soft skill necessary for employment. This addition is vital because although there is evidence that individuals with ASD and/or IDD can systematically solve problems, researchers have conducted most studies using non-VT interventions in non-virtual learning environments. Some non-VT interventions used include the self-determined learning model (Agran et al., 2002; Cote et al., 2014), systematic problem-solving intervention (Cote, 2011), verbal instructions, problem-solving strategies, etc. The following section outlines and describes the theoretical foundations for this study.

**Theoretical framework**

This study is grounded on Albert Bandura’s social learning theory (Bandura, 1969a, 1969b; Bandura & Walters, 1977) and principles of applied behavior analysis (ABA; Baer et al., 1968).

**Social Learning Theory**

Social learning theory (Bandura, 1969a, 1969b; Bandura & Walters, 1977) is the bridge between behavioral and cognitive models of learning as it views human behavior as a continuous and reciprocal interaction between cognitive, behavioral, and environmental influences. Bandura postulated that most humans learn behavior by observing and imitating models from whom they
form ideas on performing new behaviors, which are later coded and serve as a guide for action in the future. According to Bandura (1969a, 1969b), learning is an interaction between behavioral and cognitive processes within a social context whereby the learner is vicariously and symbolically reinforced while recognizing the self-regulatory processes that play an active role in their learning process. Hence, this study aligns with Bandura’s (1969a, 1969b) claim that the participants' learning (i.e., problem-solving skills) might result from their direct experience with video models due to vicarious reinforcement of the learned modeled behavior and its consequences, as represented in Figure 1 below.

Figure 1

*Concept Circle Diagram representing the Theoretical Framework*

VM as an intervention rose from within the framework of Bandura’s social learning theory (Bandura, 1969a, 1969b, 1986, 1997; Bandura & Walters, 1977) which assumes that modeling influences produce learning mainly through their informative functions and that the participants benefit by acquiring symbolic representations of the modeled activities through observation, imitation, and modeling. Bandura’s social learning theory has four crucial components for observational learning that align with VM as an intervention: attention, retention, reproduction, and motivation (Bandura, 1986). VandenBos (2013) defines observational learning as the process by which individuals acquire information, skills, or behavior through watching the
performance of others, either directly or via such media as films and videotapes. Therefore, it is an assumption in this study that the participants exhibited all four components of observational learning (i.e., attention, retention, reproduction, and motivation; Bandura, 1986) when using VM in a virtual learning environment for this study to become successful.

VM in this study aligns with and supports the four components of observational learning advanced by Bandura and Walters (1977) and Bandura (1986) in the following ways. First, the participants need to exhibit an attentional process by attending to and recognizing the essential behavioral features of the model in the videos, as it is only through attending to the stimuli that they can learn by observation. The models in this study are people and job activities with whom the participants regularly associate, as only then can they be able to delimit the appropriate behavior to observe (or attend to) and hence learn (Bandura & Walters, 1977). Moreover, the choice of participants in this study is supported by previous studies that have discovered that the attention of individuals with an ASD diagnosis improved following VM interventions (Charlop-Christy et al., 2000; Charlop-Christy & Daneshvar, 2003; Dowrick & Jesdale, 1991; Shipley-Benamou et al., 2002) as VM allowed them to focus their attention on relevant stimuli selectively. Secondly, the participants in this study need to retain the information observed via VM by coding them into meaningful symbols. They are required to store the meaningful symbols in their memory and then reproduce the information later in virtual and real job situations when the video model is no longer available (maintenance and generalization). Also, during the study, the researcher repeatedly exposed the participants to the modeled behavior through the repeated presentation of the VM in line with Bandura and Walters’ (1977) claim that rehearsals may serve as a memory aid. The need for repeated exposure of the participants to the video model also informed the design of this study (i.e., multiple-baseline designs).
Thirdly, during the study, the participants reproduced the observed behaviors by practicing the modeled patterns or their approximations by putting together a set of responses according to the modeled patterns (Bandura, 1997) in the video. Thus, VM use fulfills the production component of observational learning. In addition, there is the existence of literature to show that VM allows for the production of the learned behavior through practice (Nikopoulos & Keenan, 2003; Taylor et al., 1999) and that behavioral practice is also a key element in VM procedures (Nikopoulos & Keenan, 2003; Rehfeldt et al., 2003; Shipley-Benamou et al., 2002; Wert & Neisworth, 2003). Lastly, the researcher assumes that participants in this study can stay motivated to acquire, retain and possess the capabilities for skillful execution of the modeled problem-solving behavior (Bandura & Walters, 1977) through a video platform. Bandura (1965) outlined the importance of providing positive incentives for previously unobserved observational learning to be promptly translated into action. Studies show that individuals with ASD and/or IDD have an affinity for screen-based media, including computers, television, video games, and social media (Mazurek et al., 2012; Ward et al., 2018). High affinity for screen-based media can make VM use inherently motivating to the participants with autism (Charlop-Christy et al., 2000; Charlop-Christy & Daneshvar, 2003; Corbett, 2003; D'Ateno et al., 2003; Wert & Neisworth, 2003) in this study; hence fulfilling the motivational component of observational learning as advanced by Bandura (1986).

**Applied Behavior Analysis**

Burke et al. (2013) cite VM intervention as ingrained in Applied Behavior Analysis (ABA) principles, which capitalizes on the visual processing strength of individuals with ASD. Therefore, in addition to Bandura’s social learning theory (Bandura, 1977), this study’s design and implementation procedures align with ABA’s scientific, conceptual, and philosophical roots.
In their seminal article, Baer et al. (1968) outlined seven dimensions of ABA, which the researcher abides by throughout the design and implementation of this study. According to Baer et al. (1968), the dimensions of ABA should be such that they are applied in focus, behavioral, analytic in approach, conceptually systematic, technological in approach, effective, and suitable for generalized outcomes.

Applied in focus implies that the participant’s behavior the researcher has targeted for change in this study (i.e., problem-solving skill) is socially significant to improve the individual’s and their significant others’ lives in their work environment. Problem-solving is a socially important skill to learn because it provides a basis for all learning (Peterson, 1996b) and can significantly advance an individual’s competence and independence (Agran & Wehmeyer, 1999; Stainback & Stainback, 1996) in a workplace and beyond.

This study also focuses on the behavior of the participants as per Baer et al. (1968) dimensions of ABA, implying that the participant’s behavior the researcher has chosen to improve (i.e., problem-solving skills) has been selected and determined as in need of improvement through collaboration between the participant, their parent, and teacher. The behavior is observable and measurable, and the researcher has accounted for its reliability by ensuring that the participant’s behavior and not their own is improved/changed at the end (Baer et al., 1968).

According to Baer et al. (1968), conceptually systematic as a dimension of ABA signals that the researcher's procedures to change behavior and interpretations about why the procedures are effective should be described by the researcher in terms of relevant principles from which they have derived them. Therefore, the researcher in this study endeavors to look for commonalities in procedures that can allow for some common conceptual language to emerge so
that future researchers and practitioners may understand how they can derive similar procedures from the basic principles. Additionally, so that this study is technological in approach (Baer et al., 1968; Baer et al., 1987), the researcher describes with enough accuracy all the operative procedures in this study so that others can replicate them in the future with the same acceptable outcomes as might be the case in this study.

Further, this study also aligns with the “effective” dimension of ABA (Baer et al., 1968) by accounting for the reality that effective application of the VM intervention in a virtual learning platform can improve problem-solving amongst the participants. According to Wolf (1978), a study’s participant rather than the researcher should determine how socially significant (i.e., effective) a behavior change is by responding directly to questions relating to the intervention. The researcher in this study gave a social validity questionnaire to the participants. The social validity questionnaire asked the participants about their experience, whether they liked the study, and its preliminary outcomes following the VM intervention.

Lastly, Baer et al. (1968) stipulated that a behavior targeted for change in a study must be suitable for generalized outcomes if it aligns with ABA’s dimensions. According to Cooper et al. (2020), a behavior change has generality if it not only lasts over time and appears in environments other than one in which the researcher or practitioner implemented an intervention that initially produced it but also spreads to other behaviors not directly treated by intervention. Problem-solving as a soft skill for employment is a suitable behavior for generalization because by becoming more effective problem solvers, individuals with ASD and/or IDD can be able to set and attain goals, identify potential response alternatives in the decision-making process at work, and self-regulate their learning (Wehmeyer, Palmer, et al., 2000). Hence, this study accounts for generalization by embedding in its design an opportunity for the participants to
generalize the learned problem-solving behavior from a virtual environment to an actual work situation.

**Review of Literature**

To determine the extent of the existing literature on using VT to support soft skills for employment acquisition amongst individuals with ASD and/or IDD, the researcher sought to answer the following questions (a) What are the common types of VT interventions used by researchers, teachers, and employers to support soft skills for employment of individuals with ASD and/or IDD across existing literature? (b) Which soft skills do researchers, teachers, and employers commonly target to employ individuals with ASD and/or IDD using VT interventions? (c) What is the evidence for using VT interventions to teach and support soft skills for the employment of transition-aged individuals with ASD and/or IDD in a virtual learning environment?

**Search Strategy**

The researcher conducted a systematic literature search across nine electronic databases via Education Resources Information Centre (ERIC) EBSCOhost through Duquesne University’s Gumberg Library. The purpose of this systematic literature search was threefold. First, to determine what types of VT researchers and practitioners have used to support soft skills for employment among individuals diagnosed with ASD and/or IDD. Secondly, to determine what soft skills for employment of individuals with ASD and/or IDD have researchers and practitioners targeted using VT across existing literature and lastly, to establish the evidence for using VT interventions to teach and support soft skills for the employment of transition-aged individuals with ASD and/or IDD in a virtual learning environment. This new search was modeled after a previous study by the researcher (Oliech & Oshokoya, 2021), which yielded 19
peer-reviewed studies. The current search and review of literature enhanced the prior study (Oliech & Oshokoya, 2021) in two significant ways. First, the search string included updated Boolean search terms for problem-solving skills (i.e., Problem solving* OR Problem-solving*). Second, the researcher included gray literature (e.g., dissertations and theses) in the search. These new changes yielded eight additional studies. The researcher developed descriptors from a combination of the following keywords: “autism,” “intellectual and developmental disabilities,” “video technology,” “soft skills,” “adolescents,” and “adults,” which they then combined with different variations of Boolean operators, before running the final search for articles to review for this study. See Table 1 below for the search terms and databases related to the study.

The researcher limited the search to journal articles, theses, and dissertations published in English. There were no timeframe restrictions during the search. The researcher then organized the articles using EndNote X9.2 citation software before screening for articles eligible for review.
Inclusion Criteria

Studies were only considered for analysis if: (a) the study implemented an experimental design (single-subject or group design); (b) the study was published in the English language; (c) the study was an academic journal article, theses or dissertation; (d) participants in the study included at least one transition-aged individual (14 year or older) with a diagnosis of either ASD, IDD or its comorbidities (e) the study was conducted in a vocational classroom, a laboratory in a school or, an actual, virtual or simulated learning or work environment; (f) the study applied VT intervention or its variation and; (g) the VT intervention used focused on the acquisition and or maintenance of soft skills (Job interviewing skills, communication, empathy, maintaining a
positive attitude, teamwork and cooperation, maintaining professionalism, following work and social rules both silent and explicit, conflict resolution, and self-advocacy, etc.) targeted for improving employment outcome for the transition-aged individual with a diagnosis of ASD or IDD.

**Exclusion Criteria**

The researcher excluded studies from analysis if they were literature reviews or systematic reviews or did not meet the requirements outlined above as the inclusion criteria.

**Article Review and Coding**

The researcher coded each study that qualified for inclusion by using the following variables: Journal type (i.e., the journal in which the study was published); study design (i.e., reversal, multiple-baselines, multi-element, combined designs, randomized control trial or unknown); participant characteristics (i.e., gender, race, age, and primary disability diagnosis); study setting/location (school, community or work environment); independent variable (i.e., the type of video technology used, e.g., video modeling, video prompting, etc.); dependent variable (i.e., outcome measure of the study/soft skill targeted for intervention, e.g., social communication, maintaining a positive attitude, teamwork and cooperation, maintaining professionalism, following work and social rules both silent and explicit, conflict resolution, and self-advocacy, etc.); therapist (i.e., the person who delivered the intervention, e.g., teacher, researcher, consultant, job coach, or parent); social validity (i.e., whether a social validity measure was given after the conclusion of study or not) and lastly; maintenance and generalization (i.e., whether data was collected for maintenance and generalization or not).

Following the outlined process, the researcher summarized the literature and reported the
outcomes of the qualifying studies through thematic synthesis while emphasizing problem-solving skills interventions using VT.

Results of Review

The systematic search described above yielded a total of 1,660 articles. A total of 1,384 studies remained after removing 276 duplicates through EndNote X9.2 citation software. The researcher then screened abstracts and titles of the 1,384 studies that remained for eligibility. Next, the researcher excluded 1,339 articles after screening their titles and abstracts. Subsequently, a total of 45 studies qualified for full-text review because they satisfied the inclusion criteria.

After a full-text review, further screening eliminated 24 studies that did not meet the inclusion criteria. A total of 21 studies satisfied the inclusion criteria outlined above. The researcher then conducted a backward search by analyzing the 21 study’s reference sections to establish if additional works that the qualifying studies cited would be relevant to this study and forward search citation feature on Google Scholar (i.e., cited by function) and connected papers (https://www.connectedpapers.com/) website to establish how other researchers have cited the 21 original studies in subsequent studies. This backward and forward search procedure yielded six additional studies that met the inclusion criteria. In the end, the author included 27 ($N = 27$) studies that met the inclusion criteria for qualitative analysis. A summary of the article selection process is outlined in a PRISMA flow diagram below.
Journal Types

The researcher included and analyzed a total of 27 academic journal articles, dissertations, and theses in this study. The studies were published in 17 different journals and

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1 Adapted from http://prisma-statement.org/PRISMAStatement/FlowDiagram
dissertation databases. Journal of Autism and Developmental Disorders published most of the studies \((n = 6)\), followed by four dissertations/theses \((n = 4)\) published in various universities’ scholarship collection databases. The Journal of Vocational Rehabilitation \((n = 2)\) and Career Development and Transition for Exceptional individuals \((n = 2)\) published four studies. The rest of the 13 articles were published in 13 different journals, including Journal of Educational Technology and Society; Annual Review of Cyber Therapy and Telemedicine; Journal of Special Education Technology; Behavioral Interventions; British Journal of Special Education; British Journal of Occupational Therapy; Journal of Positive Behavior Interventions; Developmental Neurorehabilitation; Journal of the Division on Autism and Developmental Disabilities; Council for Exceptional Children (DADD Online Journal); Education and Training in Autism and Other Developmental Disabilities; Focus on Autism and Other Developmental Disabilities and, Journal of Applied Behavior Analysis.

**Study Designs**

The most common study design observed across studies was the multiple-baseline design, which appeared in ten \((n = 10)\) different studies (Barnes, 2014; Bross et al., 2019; Bross et al., 2020; Kellems et al., 2020; Koegel et al., 2016; Moore, 2015; Morgan & Salzberg, 1992; Rausa et al., 2016; Rosales & Whitlow, 2019; Walker et al., 2016). Experimental design followed as the design of choice in six \((n = 6)\) studies (Burke et al., 2018; Burke et al., 2021; Custodio, 2016; Hayes et al., 2015; Rosen et al., 2017; Ward & Esposito, 2019). Then there were five \((n= 5)\) multiple-probe design studies (Bahcali & Ozen, 2019; Mackey & Nelson, 2015; Park et al., 2020; Walsh et al., 2018; Yakubova & Zeleke, 2016). Researchers used a randomized control trial design across three \((n = 3)\) studies (Humm et al., 2014; Smith et al., 2014; Strickland et al., 2013). The least common study designs include alternating treatments design employed in one \((n
1) study by Van Laarhoven, Carreon, et al., 2018, multiple treatments with reversal design in one study \( (n = 1) \) by Van Laarhoven et al. (2014), and ABCA design in one study \( (n = 1) \) by Lopez (2019).

**Participant Characteristics/Demographics**

A summary of the participants' demographics is shown in Table 2 below. A total of 463 participants \( (N = 463) \) participated in the 27 studies. Approximately 74% of the participants were male \( (n = 344) \), while 26% were female \( (n = 119) \). Adolescents (i.e., between 14 and 18 years old) \( (n = 95) \) were 21% across the studies, with adults (i.e., above 18 years old) \( (n = 368) \) representing about 79% of the total study population. The most common disability category amongst the participants was ASD \( (n = 287) \), which represented nearly 62% of the total study population, followed by ID \( (n = 69) \), which represented about 15% of the study population, then comorbidity between ASD and ID \( (n = 15) \) which represented almost 3.2% of the total study population. Other disability category combinations observed in the analyzed studies included a combination of ASD and other disorders (e.g., Attention Deficit Hyperactivity Disorder, Bipolar, and Obsessive-Compulsive Disorders) \( (n = 5) \), which represented about 1% of the study population, followed by comorbidity between ID and physical disability or seizure disorders \( (n = 3) \) which accounted for approximately 0.6% of the total study population. A significant population \( (n = 84) \) represented roughly 18.1% of the total study population with a disability diagnosis that was neither ASD nor IDD. With neither ASD nor IDD diagnosis, the researcher coded the group as “other.” It included individuals who participated in a study with individuals with ASD and/or IDD yet had schizophrenia or post-traumatic stress disorders.

Finally, most of the participants in the studies analyzed were white \( (n = 69) \). White participants represented about 18.1% of the total study participant population. Hispanics \( (n = 72) \)
constituted 16% of the study population, followed by blacks ($n=12$), who constituted roughly 3%. Asians ($n=2$) and Biracial ($n=2$) participants each accounted for close to 0.4% of the total study population. A significant proportion of participants ($n=306$) were not categorized by race. This non-categorized group accounted for about 66% of the total study population. The lack of classification may be attributed to study designs in the three randomized control trial studies.

Table 2

Summary of Participants Demographics

<table>
<thead>
<tr>
<th>Category</th>
<th>Descriptor</th>
<th>Total ($n$)</th>
<th>Approximate Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>344</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>119</td>
<td>26</td>
</tr>
<tr>
<td>Age</td>
<td>Adolescents (Age 14-18)</td>
<td>95</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Adults (Age 18+)</td>
<td>368</td>
<td>79</td>
</tr>
<tr>
<td>Primary diagnosis</td>
<td>ASD</td>
<td>287</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>ASD + ID</td>
<td>15</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>ASD + other (ADD, bipolar, OCD)</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ID/Mental Retardation</td>
<td>69</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>ID + Other (Physical disability, seizure disorder)</td>
<td>3</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>Other (Schizophrenia, PTSD)</td>
<td>84</td>
<td>18.1</td>
</tr>
<tr>
<td>Race</td>
<td>White</td>
<td>69</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
<td>72</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Asian</td>
<td>2</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>Biracial</td>
<td>2</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>Not categorized</td>
<td>306</td>
<td>66</td>
</tr>
</tbody>
</table>

Study Location

There were nine ($N=9$) different locations where the studies took place. The study locations replicated competitive work environment activities, interactions, and task performance to a large extent. The nine study locations were transition programs ($n=6$) (Barnes, 2014; Kellems et al., 2020; Mackey & Nelson, 2015; Moore, 2015; Park et al., 2020; Ward & Esposito,
persons that implemented the intervention

Researchers implemented a total of twenty-two studies (n = 22) (Bahcali & Ozen, 2019; Barnes, 2014; Bross et al., 2019; Burke et al., 2018; Burke et al., 2021; Custodio, 2016; Hayes et al., 2015; Humm et al., 2014; Kellems et al., 2020; Koegel et al., 2016; Lopez, 2019; Moore, 2015; Morgan & Salzberg, 1992; Park et al., 2020; Rausa et al., 2016; Rosales & Whitlow, 2019; Rosen et al., 2017; Smith et al., 2014; Strickland et al., 2013; Walker et al., 2016; Ward & Esposito, 2019; Yakubova & Zeleke, 2016) which equated to about 81% of the total studies analyzed. Researchers also collaborated with a teacher (Van Laarhoven, Carreon, et al., 2018) (n = 1); job coaches (Van Laarhoven et al., 2014) (n =1), with coworkers, job coaches, and supervisors (n = 1) (Bross et al., 2020) and with teachers and parents (n = 1) (Walsh et al., 2018). Studies in which researchers collaborated with other professionals accounted for about 15% of the general studies. Furthermore, only one study (n = 1) by Mackey and Nelson (2015) did not
involve researchers. Certified special education teachers and a job coach implemented the Mackey and Nelson (2015) study, accounting for about 4% of the total studies.

**Independent Variables**

Seven different VT interventions (N = 7) were implemented across the 27 studies. VM (n = 9) (Bahcali & Ozen, 2019; Bross et al., 2019; Bross et al., 2020; Morgan & Salzberg, 1992; Rausa et al., 2016; Park et al., 2020; Rosen et al., 2017; Walsh et al., 2018; Yakubova & Zeleke, 2016) was the most common type of VT intervention used to support soft skills acquisition and development for the employment of individuals with ASD and/or IDD across multiple studies. VM represented about 33% of the total analyzed studies. Virtual reality (n = 7) (Burke et al., 2018; Burke et al., 2021; Humm et al., 2014; Lopez, 2019; Smith et al., 2014; Strickland et al., 2013; Ward & Esposito, 2019) was the second most common video type technology utilized across the studies. Virtual reality represented around 26% of the total number of studies. Video feedback (n = 5) (Barnes, 2014; Koegel et al., 2016; Mackey & Nelson, 2015; Moore, 2015; Rosales & Whitlow, 2019) was the third most common type of VT intervention utilized across studies. Video feedback represented almost 19% of the total number of analyzed studies.

The least common types of VT interventions recorded across the analyzed studies were a blend of multi-video intervention designs, and they included a combination of VM and video feedback (n = 2) (Kellems et al., 2020; Van Laarhoven et al., 2014) which accounted for almost 7% of analyzed studies and VM and video prompting (n = 2) (Custodio, 2016; Hayes et al., 2015) which also accounted for about 7% of the total studies. Other additional least common solitary VT interventions reported included video prompt alone (n = 1) by Van Laarhoven, Carreon, et al. (2018), which accounted for roughly 3% of the analyzed studies, and mixed
reality \((n = 1)\) by Walker et al. (2016) which also accounted for approximately 3\% of the total studies.

Dependent Variables/ Soft Skills

The soft skills targeted for the employment of individuals with ASD and/or IDD using VT interventions vary across the 27 studies. Researchers, practitioners, job coaches, and parents targeted seven diverse soft skills \((N=7)\) to increase the employment opportunities of individuals diagnosed with ASD and/or IDD using multiple VT interventions. The most common soft skills reported across the studies were job interview skills \((n = 14)\) (Barnes, 2014; Bahcali & Ozen, 2019; Burke et al., 2018; Burke et al., 2021; Custodio, 2016; Hayes et al., 2015; Humm et al., 2014; Lopez, 2019; Moore, 2015; Rosales & Whitlow, 2019; Smith et al., 2014; Strickland et al., 2013; Walker et al., 2016; Ward & Esposito, 2019), followed by employment-related social skills \((n = 6)\) (Kellems et al., 2020; Koegel et al., 2016; Park et al., 2020; Rosen et al., 2017; Van Laarhoven et al., 2014; Walsh et al., 2018) then problem-solving skills \((n = 3)\) (Morgan & Salzberg, 1992; Rausa et al., 2016; Yakubova & Zeleke, 2016). Some of the least common soft skills reported in the studies were decision-making skills \((n = 2)\) (Mackey & Nelson, 2015; Van Laarhoven, Carreon, et al., 2018) and customer service skills \((n = 2)\) (Bross et al., 2019; Bross et al., 2020) followed by requesting assistance \((n =1)\) in a study by Morgan & Salzberg (1992) and telephone skills \((n = 1)\) in a study by Rausa et al. (2016).

Participant’s Outcomes from VT

Outcomes across studies that analyzed VT’s use in teaching soft skills for employment vary. VT's use in teaching job interviewing skills as soft skills for employment of individuals with ASD and/or IDD showed the likely existence of a positive relationship between using VT and improving job interview skills. Studies that used VM (Bahcali & Ozen, 2019), virtual reality
(Burke et al., 2018; Burke et al., 2021; Humm et al., 2014; Lopez, 2019; Smith et al., 2014; Strickland et al., 2013; Ward & Esposito, 2019), VM and video prompting (Custodio, 2016; Hayes et al., 2015), video feedback (Barnes, 2014; Moore, 2015; Rosales & Whitlow, 2019), and mixed reality (Walker et al., 2016) to teach job interview skills reported measurable improvement in job interviewing skills post-intervention. However, a difference in reported outcomes was evident in some studies (Barnes, 2014; Rosales & Whitlow, 2019; Strictland et al., 2013). Rosales and Whitlow (2019) employed video feedback to examine the impact of several components of a job interview training package on six participants' responses to commonly asked interview questions. While Rosales and Whitlow (2019) reported an increased response across most participants because of video feedback, all the participants still required a behavior skills training session to meet the mastery criterion for accurate responses during scheduled interviews. Also, whereas Strictland et al. (2013) reported improved production of more appropriate verbal responses to interview questions following a virtual reality intervention package, the features accompanying those responses (e.g., posture, eye contact approximation, affect of facial expression) did not improve to the same degree. The finding by Strictland et al. (2013) was contrary to what Barnes (2014) reported in a study that involved three adults diagnosed with ASD using video feedback to determine the percentage of time they engaged in eye contact during mock job interviews. Barnes (2014) established that video feedback was effective in increasing the duration of time each participant engaged in eye contact during the mock interview, unlike Strictland et al. (2013), who reported that nonverbal behaviors like posture, facial expressions, and eye contact did not improve following a virtual reality job interview intervention.
Using VM to teach customer service skills (Bross et al., 2019; Bross et al., 2020) as a soft skill for employment was also viable. Bross et al. (2019) attempted to ascertain whether a VM intervention would increase the verbalization of three customer service phrases (greetings phrase, service phrase, and closing phrase) for a young adult with high-functioning autism employed in their local community. Bross et al. (2019) established that each customer service behavior immediately improved after VM intervention. Greeting phrases used during baseline was 6% (range = 0%–10%) and increased to 94% (range = 55%–100%) during the intervention. The baseline level for the service phrase was 16.5% (range = 0%–33%) and 95% (range = 90%–100%) during the intervention. During the intervention, the baseline level for closing phrases was 15% (range = 0%–40%) and 85% (range = 50%–95%). Bross et al. (2020) replicated the preceding study (Bross et al., 2019) by including more participants, diverse community employment settings, and natural intervention agents. In their finding, Bross et al. (2020) reported VM as an effective intervention in enhancing quality customer interactions.

The positive effect of VT use to teach social skills for employment was also evident. The application of variations of VT, including a combination of VM and video feedback (Kellems et al., 2020; Van Laarhoven et al., 2014); video feedback alone (Koegel et al., 2016); and VM (Park et al., 2020; Rosen et al., 2017; Walsh et al., 2018) all showed improved outcomes in social skills for employment implying the existence a functional relationship between the use of a VT intervention and improved employment social skills (i.e., social conversation skills). Interestingly, Van Laarhoven et al. (2014) associated video feedback with higher employment-related social skills than VM. Van Laarhoven et al. (2014) investigated using both VM and video feedback intervention to examine independent correct responses to vocational tasks and appropriate employment-related social skills amongst four young adults with ASD and/or IDD.
Three of four participants in the study by Van Laarhoven et al. (2014) demonstrated a substantial gain with video feedback conditions. Similar outcomes of studies involving VT interventions to teach social skills for employment were evident. These similarities were more pronounced in the studies during the maintenance of the acquired social skills, following the VT's withdrawal, except in Van Laarhoven et al. (2014) and Rosen et al. (2017), who reported neither maintenance nor generalization. Only Koegel et al. (2016) reported generalization of the acquired social skills among participants in their study. Finally, while the use of VT interventions seemed to result in improved outcomes in employment-related social skills, it is imperative to note that all of the studies (Kellems et al., 2020; Koegel et al., 2016; Park et al., 2020; Rosen et al., 2017; Van Laarhoven et al., 2014) utilized one or more additional strategy together with VT thereby making it difficult to prove which intervention contributed to the outcomes in reality.

Regarding decision-making as a soft skill, VT's impact on decision-making skills was ambiguous because two studies (Van Laarhoven, Carreon, et al., 2018; Mackey & Nelson, 2015) reported contradictory findings. Van Laarhoven, Carreon, et al. (2018) compared mobile technologies with universally designed prompting systems that included video prompts to improve four adolescents with ASD and ID independent vocational performance and decision points correctly selected in school-based employment settings. This study reported an immediate and substantial increase in decision-making and a correct response in three out of four participants. The participants also selected video prompts more often than other media prompts during the initial sessions before fading to less intrusive ones. That the participants favored video prompts more was consistent with past studies (Mazurek et al., 2012; Ward et al., 2018) that showed individuals with ASD and/or IDD to have a high affinity to screen-based media. Van Laarhoven, Carreon, et al. (2018) also showed that students' performance was slightly better
when using a preferred mobile device. Contrastingly, Mackey and Nelson (2015) examined the effectiveness of video feedback in improving job-related behaviors that included decision-making and other skills (i.e., active engagement, responding to others, hygiene, and transition making). This study's outcome was noteworthy because it showed that video feedback intervention had the least impact on decision-making. The lack of significant outcome in decision-making skills amongst twin participants, as Mackey and Nelson (2015) reported, may, however, be attributed to the higher ceilings in decision-making skills between the two twin participants at baseline (i.e., they were not experiencing challenges with decision-making skills at the time of the study).

VM utilization to train three adults (37, 37, and 34-year-olds) with severe IDD to request the supervisor’s assistance when encountering work problems (Morgan & Salzberg, 1992) showed the likely existence of a functional relationship between VM intervention and asking for help as a soft skill for employment. However, participants in the study by Morgan and Salzberg (1992) did not consistently generalize the skill (requesting assistance) to a work setting until they rehearsed. Overall, solving work-related problems using VT seemed beneficial, as reported across three studies (Morgan & Salzberg, 1992; Rausa et al., 2016; Yakubova & Zeleke, 2016). Morgan and Salzberg's (1992) application of VM for problem-solving showed a positive outcome. Following the study, the two participants with IDD identified work problems and fixed and reported them in a work setting. Follow-up assessments revealed how effective VM intervention was in this study by Morgan and Salzberg (1992). However, while the participants maintained most responses over 60 days, they failed to generalize treatment effects on a novel work problem.
Similarly, Rausa et al. (2016) established VM as helpful in problem-solving for a 23-year-old adult with autism. The adult in the study by Rausa et al. (2016) increased their ability to solve problems by taking action following complaints and orders made using a telephone (an Apple iPhone). Taking action for complaints received via telephone calls increased markedly from 13% at baseline to 80% following VM intervention. Taking action following orders made via telephone calls also improved from 63% at baseline to 90% following VM intervention, signifying VM’s efficacy in teaching problem-solving in the work setting. Support for VM intervention by Rausa et al. (2016) was buttressed by a reported effect size of above 90%, signifying a very effective intervention. Teaching telephone skills (i.e., listening and professional speech) using VM by Rausa et al. (2016) translated to improved performance in a 23-year-old male with ASD when answering and responding to telephone calls. While listening skills increased from 59% at baseline to 90%; and professional speech from 53% to 79% with a high effect size of about 0.9, this study's findings may not be suitable for generalizing because the study involved only one participant who was familiar to the research team.

Finally, Yakubova and Zeleke (2016) observed increased problem-solving behavior among adolescent participants following a VM intervention. The adolescent participants in the study by Yakubova and Zeleke (2016) completed a series of steps for problem-solving during transition-related tasks following a point-of-view VM instruction. The participants' mean responding rate was 95% across phases, with a 100% generalization to a second untrained setting. This increased performance symbolizes VM intervention's effectiveness in teaching problem-solving skills in Yakubova and Zeleke's (2016) study. The studies by Morgan and Salzberg (1992), Rausa et al. (2016), and Yakubova and Zeleke (2016) utilized VM as the primary intervention for teaching problem-solving skills.
Social Validity

About 81% (n = 22) of the studies reported social validity outcomes. The participants said the interventions were enjoyable and helpful, instilled confidence, and prepared them for future interviews and vocational skills tasks. The most common method used for determining social validity in the studies was questionnaires answered by participants and their teachers or supervisors (n = 10; 37%) (Barnes, 2014; Bross et al., 2019; Bross et al., 2020; Kellems et al., 2020; Moore, 2015; Rausa et al., 2016; Rosales & Whitlow, 2019; Rosen et al., 2017; Smith et al., 2014; Yakubova & Zeleke, 2016). Followed by interviewing participants and their teachers (n = 5; 18.5%) (Bahcali & Ozen, 2019; Custodio, 2016; Hayes et al., 2015; Humm et al., 2014; Park et al., 2020), which was the next most common social validity measure across the studies.

Other least common measures of social validity reported across the studies were social desirability Likert-type scale (n = 3; 11.1%) (Koegel et al., 2016; Lopez, 2019; Ward & Esposito, 2019), use of community employers to rate participant’s request for assistance pre and post-assessment (n = 1; 3.7%) by Morgan and Salzberg (1992), a social validation scale to participants and teaching staff (n = 1; 3.7%) by Van Laarhoven, Carreon, et al. (2018), surveys given to participants and job coaches (n = 1; 3.7%) by Van Laarhoven et al. (2014), and the use of an interview with participants and questionnaires to parents and teachers (n = 1; 3.7%) as was in the study by Walsh et al. (2018). A total of five studies (n = 5; 18.5%) (Burke et al., 2018; Burke et al., 2021; Mackey & Nelson, 2015; Strickland et al., 2013; Walker et al., 2016) did not report any measure of social validity.

Maintenance and Generalization

Researchers in fourteen studies (n = 14; 52%) accounted for generalization and maintenance (Bahcali & Ozen, 2019; Bross et al., 2020; Humm et al., 2014; Kellems et al., 2020;
Koegel et al., 2016; Lopez, 2019; Mackey & Nelson, 2015; Morgan & Salzberg, 1992; Park et al., 2020; Rausa et al., 2016; Rosales & Whitlow, 2019; Walker et al., 2016; Walsh et al., 2018; Yakubova & Zeleke, 2016) in comparison to thirteen \( (n = 13; 48\%) \) (Barnes, 2014; Bross et al., 2019; Burke et al., 2018; Burke et al., 2021; Custodio, 2016; Hayes et al., 2015; Moore, 2015; Rosen et al., 2017; Smith et al., 2014; Strickland et al., 2013; Van Laarhoven, Carreon, et al., 2018; Van Laarhoven et al., 2014; Ward & Esposito, 2019) who did not report for generalization or maintenance.

Overall, most participants maintained and generalized the target behaviors for a prolonged time after VT intervention withdrawal for all studies in which the researchers reported generalization and maintenance. The only inconsistency observed was in the study by Morgan and Salzberg (1992), in which the effects of a VM intervention for identifying, fixing, and reporting work problems failed to generalize to a novel work problem.

**Summary of Literature Review**

This literature review’s purpose was to determine what VT interventions researchers and practitioners have used to target soft skills for the employment of individuals with ASD and/or IDD, to determine the type of soft skills necessary for the employment of individuals with ASD and/or IDD researchers and practitioners have commonly targeted using VT interventions. Also, to establish if there is evidence for effectively using VT interventions in a virtual learning environment to teach and support soft skills acquisition for the employment of transition-aged individuals with ASD and/or IDD.

Quantitative data analysis about the first question, which related to common types of VT interventions used to support soft skills for employment of individuals with ASD and/or IDD, revealed seven \( (n = 7) \) different VT interventions implemented across studies. VM was the most
common type of VT intervention \((n = 9)\) applied in most studies, followed by virtual reality \((n = 7)\) and video feedback \((n = 5)\), which was also common. The least common VT interventions targeting soft skills for employment among individuals with ASD and/or IDD fell into two categories. The first category blended two VT types: VM and video feedback \((n = 2)\) and; VM and video prompting \((n = 2)\). The second category involved using single VT interventions like video prompts (i.e., video prompts alone) \((n = 1)\) and mixed reality (i.e., mixed reality alone) \((n = 7)\). It is also important to note that researchers and practitioners combined most video interventions with other non-video interventions (e.g., explicit instruction, self-monitoring, prompting systems, interviews, curriculum training packages, and other behavioral learning techniques) or applied video intervention as a secondary intervention. This combination of interventions made establishing VT intervention's absolute efficacy on targeted employment soft skills challenging.

The second question relating to the type of soft skills commonly targeted for employing individuals with ASD and/or IDD using VT interventions revealed seven \((N = 7)\) different soft skills. The most common soft skills reported across studies were job interviewing skills \((n = 14)\) and employment-related social skills \((n = 6)\). The least common soft skills targeted were problem-solving skills \((n = 3)\), decision-making skills \((n = 2)\), customer service skills \((n = 2)\), requesting assistance \((n = 1)\), and telephone skills \((n = 1)\). Interviewing skills were the most targeted soft skills indicating researchers' and practitioners' effort to bridge the gap in unemployment of individuals with disabilities compared to peers without disabilities by equipping them with skills essential for obtaining a job. This effort is commendable given the wide unemployment gap among individuals with ASD and/or IDD compared to their peers, as Shattuck et al. (2012) reported. Consistent with the findings by Munandar et al. (2020), the
elements of job interviewing skills targeted across studies included verbal behavior before and after the interview (e.g., appropriate greeting, responses to interview questions, etc.) and non-verbal behavior (e.g., eye contact, body positioning, and handshakes). It is apparent that while using VT interventions for job interview skills acquisition is useful, as reported across the studies, it might be more viable if combined with other evidence-based interventions. Some of the non-video interventions that researchers successfully applied with VT included behavior skills training (Rosales & Whitlow, 2019), behavior learning techniques (Lopez, 2019), explicit training (Burke et al., 2018), and curriculum-based packages or instruction strategies (Burke et al., 2021; Rosales & Whitlow, 2019; Strictland et al., 2013; Walker et al., 2016). All of the additional strategies are likely to have also contributed to positive interview skills outcomes. Additionally, Custodio (2016) established that incorporating a persuasive design into a VM and video prompting intervention could be efficient in realizing an improved interview performance. A persuasive design is a VT intervention design that incorporates additional techniques (e.g., custom alerts and reminders) that attempt to shape, reinforce, or change an individual's behaviors, feelings, or thoughts toward the performance of a dependent variable (Bonanni et al., 2005).

There was doubtful evidence about using VT interventions to teach soft skills necessary to employ individuals with ASD and/or IDD in a virtual learning environment across the analyzed studies per the third research question. While researchers and practitioners conducted studies using a computer at a mainstream school (Rosen et al., 2017) and on a computer using virtual reality (Burke et al., 2018; Burke et al., 2021; Hummel et al., 2014; Lopez, 2019; Smith et al., 2014; Strickland et al., 2013; Ward & Esposito, 2019) or mixed reality (Walker et al., 2016) at various transition programs, there was no indication in the studies that the interventionists
intention was to conduct the studies in an online platform. Greer et al. (2014) define virtual learning as a type of learning whereby education content and instruction are delivered primarily over the Internet. However, none of the studies analyzed in this literature review explicitly indicated that its authors mainly intended to provide or deliver content and/or soft skills-related instruction to the participants over the internet.

Overall findings upon analysis of published literature indicate that VT's use to target soft skills for employment of individuals with ASD and/or IDD is ubiquitous, promising, and beneficial, as seen in the 27 studies included for analysis upon fulfilling the inclusion criteria. For example, the teaching of telephone and social skills for employment (i.e., conversation initiation skills/social conversation skills) using VT can lead to improved adaptive skills in other areas not targeted but are equally important for success in a job, as was seen in the study by Rausa et al. (2016). The VM intervention resulted in improved responses to telephone calls. The response criteria completed correctly after the VM intervention also increased and became less variable for actions–orders and professional speech in association with introducing the VM intervention listening and actions–complaints, respectively. The Rausa et al. (2016) study findings corroborate the importance of equipping individuals with ASD and/or IDD with soft skills as it might allow them to learn other necessary skills (hard skills) that may help them to become successful in competitive jobs (i.e., soft skills could provide behavioral cusps). Teaching transition-aged individuals with ASD and/or IDD telephone etiquette in the work environment is even critical today, considering mobile phones' ubiquity and their sometimes-inappropriate use in the work environment.

While research efforts should be of practical value and socially important to the individuals with a disability with whom the study is focused (Baer et al., 1968), a substantial
number of studies reviewed did not report a measure of social validity (18.5%). However, this omission does not diminish the outcomes of the studies that reported social validity. Participants across the analyzed studies said the VT interventions were enjoyable and helpful, instilled confidence, and even prepared them for future interviews and vocational tasks. Including a report on social validity in all the studies would have strengthened the findings for the evidence related to the first research question.

Finally, only Walker et al. (2016) utilized mixed reality as an intervention to target soft skills for employment. The cost of acquiring and using mixed reality may be prohibitive to most education programs, where preferable interventions should be affordable, easily accessible, and easy to use. Additionally, mixed reality may not align with individuals with ASD and/or IDD's strengths and characteristics, including sensory stimulation challenges in high light or sound intensity conditions, making such practices as mixed reality irritable. Although research specific to teaching individuals with ASD and/or IDD soft skills using VT was sparse, as seen in this review of literature, evidence suggests that these individuals can benefit from using VT interventions while working towards their transition goals, seeking employment, and even maintaining employment once they get a job.

**Gaps in Literature**

Gaps in existing literature evident from this analysis concern the number of adolescents who participated in these studies, the paucity of studies targeting other equally important soft skills other than job interviewing skills, lack of studies supporting the maintenance and improvement of soft skills while in actual employment, a few studies conducted in real competitive employment settings, a few studies conducted in virtual learning environments and lack of measuring for reactivity across studies.
Fewer adolescents than adults participated in the reported studies (see Table 2). This discrepancy in the number of adolescents in studies involving VT interventions to teach soft skills for employment is worrying, considering that according to IDEA, the transition age should not begin later than age 16 (14 in Pennsylvania). It would be a valid assumption to expect most studies to report a higher percentage of adolescents and adults between 18-21 years old’s (because they can bank their diploma at this age) participation, unlike what is reported in these findings. For researchers and practitioners to achieve positive employment outcomes with individuals with ASD and/or IDD, interventions should start early. If started late, the individuals with ASD and/or IDD risk trailing behind their peers with or without disabilities in necessary skills like soft skills for employment. In addition, the lack of the essential soft skills may put them at risk of unemployment or losing their jobs once employed because while they may receive support from job coaches and other vocational rehabilitation personnel, employers may not be very patient in letting them learn soft skills while on the job at the expense of making profits.

Most studies used VT to teach job interviewing skills in favor of other equally important soft skills necessary for employment. This result indicates that researchers and practitioners are focusing on finding employment opportunities for individuals with ASD and/or IDD rather than helping them acquire skills that will help them maintain jobs. Given individuals with ASD and/or IDD’s characteristics related to differences in cognitive, social, and communication skills, however, it may be challenging for them to keep jobs after acquiring them without competence in other equally important soft skills. Therefore, researchers should focus on other less-targeted soft skills (e.g., problem-solving, decision-making, customer service, requesting assistance, etc.) moving forward.
So far, no studies focus on teaching soft skills necessary for employment in a virtual learning environment or supporting individuals with IDD and ASD’s soft skill maintenance and improvement using VT interventions after getting into actual competitive employment. This observation is buttressed by the evidence of fewer studies conducted in virtual learning environments (Humm et al., 2014) and integrated actual employment settings. In addition, few in vivo VT interventions targeting soft skills for individuals with ASD and ID may suggest a lack of generalization of the existing studies' findings.

Lastly, none of the studies reported the participants' reactivity toward the VT intervention to target soft skill acquisition except for one by Bross et al. (2020), which acknowledged that improved work performance skills might have been partially attributed to participant awareness of researchers observing them during a VM intervention targeting customer service skills in a community setting. Reactivity arises when raising awareness of one’s behavior when VT intervention is in place helps trigger subsequent behavior changes. Future research should investigate the influence of reactivity from video recording, especially for video feedback studies, because most people respond differently.

**Implications of Findings from Reviewed Literature**

The findings of this literature review contribute to research and practice in several ways. First, this literature review adds to the knowledge about the use of VT to improve employment skills amongst youth and adults with ASD and/or IDD, as reported in a recent systematic literature review by Munandar et al. (2020), except by targeting soft skills for employment to transition-age students with ASD and/or IDD unlike in the study by Munandar et al. (2020). Munandar et al. (2020) broadly target competitive employment skills (i.e., hard and soft skills). Secondly, this review’s outcomes set the stage for researchers and practitioners to be aware of
gaps in the literature about equipping individuals with ASD and/or IDD with less targeted soft skills necessary to ensure their high transition rates into integrated employment settings. Third, the review’s findings add to research regarding VT interventions' effectiveness in teaching transition-related soft skills to students with ASD and/or IDD to improve transition outcomes, as is the expectation in IDEA (2004) accountability checks. Lastly, the findings of this literature review provide a basis for replicating the reported studies in a virtual learning environment, as they have provided a good foundation from which to start developing such studies in the backdrop of the COVID-19 pandemic, which has necessitated remote learning.

This literature review has demonstrated that researchers have conducted most of the studies reported as sole interventionists. That a researcher is a sole interventionist in most of the studies (81%) may indicate research to practice gap whereby the researchers conduct a lot of good research on soft skill acquisition amongst individuals with ASD and/or IDD, yet there is nobody to translate their findings to practice in actual work environments. Future research should bridge this gap by involving teachers, practitioners, and other natural supports (e.g., parents) in the studies as interventionists. Only through such collective efforts will the research findings be easy to generalize out of study settings because all involved will have a sense of commitment, understanding, and ownership of the process, benefitting individuals with ASD and/or IDD.

Future research should also be conducted more in in-vivo and virtual educational and employment settings and broadened to include more transition-aged adolescents (14-19 years old) as participants. Researchers should similarly focus more on other less targeted soft skills (i.e., problem-solving skills, decision-making skills, customer service skills, requesting assistance, and telephone skills) to help individuals with ASD and/or IDD maintain jobs once they acquire them following successful interviews. Finally, future research should further
investigate the benefits of creating meaningful employment for adults with ASD and/or IDD using VT by designing personalized single-subject interventions based on soft skills strengths, deficits, and interests that may be assessed directly by the participant, as was in the study by Rausa et al. (2016). Using the single-subject research design in future studies will likely provide more meaningful data about the efficacy of VT to target soft skills among individuals with ASD and/or IDD, given their unique characteristics that researchers cannot capture accurately in experimental studies like the randomized control trials, which generalize study outcomes.

In conclusion, based on extant research, VT is an effective strategy for supporting individuals diagnosed with ASD and/or IDD in school and community-based work environments to acquire and develop soft skills necessary for obtaining and maintaining competitive employment. However, there is a paucity of studies targeting specific soft skills competencies essential for maintaining competitive employment among individuals with ASD and co-occurring IDD in real work environments and a scarcity of studies targeting some soft skills like problem-solving, decision-making, customer service, requesting assistance, and telephone skills in a virtual learning environment. In addition, most existing studies use combined interventions making it challenging to establish a functional relationship between VT use and soft skill outcomes. Some studies also target more than one soft skill, making it difficult to show what VT interventions can significantly improve specific soft skills.

**Limitations of the Reviewed Literature**

This literature review has several limitations related to the process and the characteristics of individual studies analyzed—first, the process. The inclusion and exclusion criteria narrowed the articles reviewed in this study to only those which used VT to target soft skills for employment. This action may have led to excluding several other studies that targeted soft skills
acquisition amongst individuals with ASD and/or IDD using other feasible non-VT interventions. Additionally, the Boolean phrases and search strings generated using the EBSCOhost Databases’ thesaurus feature may not have captured all the terms defining soft skills and VT across literature, thereby limiting the number of studies reviewed but also the number of soft skills reported. Finally, there were no fidelity checks for this literature review in the form of inter-observer agreements (IOA). IOA is considered standard practice in systematic literature analysis. The lack of IOA may have led to the inclusion of studies that did not qualify for analysis, or it may have excluded studies that justified inclusion. This uncertainty in determining which studies qualified for inclusion or exclusion may render some of this study’s outcomes biased.

The second limitation concerns individual study characteristics. Even though the researcher disaggregated participant population characteristics by race, gender, primary diagnosis, and age during the analysis of the reviewed studies (see Table 2), a significant percentage (66%) of the participant's race is not reported across the studies. This large proportion of non-categorized individuals by race makes it difficult to establish VT intervention's efficacy in teaching soft skills necessary for employing individuals with ASD and/or IDD diagnosis when a researcher factors in participants' race. Furthermore, some studies targeted both soft skills, life skills, and hard skills (e.g., active engagement, decision-making, appropriate responding to others, hygiene, and transition making) as by Mackey and Nelson (2015), which makes it difficult to determine the true effect of the VT intervention on the soft skill (i.e., decision making). Besides, some studies combined VT with other interventions like explicit instructions (Burke et al., 2018), behavior skills training (Rosales & Whitlow, 2019), behavioral learning techniques (Lopez, 2019), and curriculum-based packages (Rosales & Whitlow, 2019; Strictland
et al., 2013; Walker et al., 2016) or curriculum instruction strategies (Burke et al., 2021). Using VT interventions as a primary or secondary intervention with other interventions makes it challenging to determine and understand which intervention was responsible for the recorded changes in targeted soft skills. Furthermore, a substantial proportion of studies did not measure social validity ($n = 5; 18.5\%$), making it difficult to determine whether some participants derived meaning from participating. Lastly, interventionists did not conduct most of the studies in-vivo (i.e., in real employment settings) and did not account for maintenance and generalization in most studies, making it challenging to determine the intervention's real effect after the interventionist withdrew treatment.
Chapter III
Methodology

Overview

The reported literature in Chapter 2 demonstrated that using video technology (VT) to support soft skills acquisition for employment is viable. The most common soft skill researchers and practitioners have targeted using VT interventions across studies are job interviewing skills (Barnes, 2014; Bahcali & Ozen, 2019; Burke et al., 2018; Burke et al., 2021; Custodio, 2016; Hayes et al., 2015; Humm et al., 2014; Lopez, 2019; Moore, 2015; Rosales & Whitlow, 2019; Smith et al., 2014; Strickland et al., 2013; Walker et al., 2016; Ward & Esposito, 2019). While this effort is commendable given the wide unemployment gap between individuals with autism spectrum disorders (ASD) and intellectual and developmental disabilities (IDD) and their nondisabled peers (Shattuck et al., 2012), it is also an indication that researchers and stakeholders are intensely focusing on finding employment opportunities for individuals with ASD and/or IDD rather than helping them maintain jobs as well. Hence, the researcher developed a study in this chapter to explore how video modeling (VM) can be used in a virtual learning environment to teach problem-solving skills as a soft skill for employment to transition-aged individuals with ASD and/or IDD diagnoses to acquire and maintain competitive employment in their communities. This chapter outlines and describes the research method used in this study, the participants, materials, measures, description of independent and dependent variables, reliability checks, procedures followed for study implementation, and methods used to analyze the data. This study sought to answer the following research questions (a) Can practitioners effectively use a video modeling (VM) intervention in a virtual learning platform to teach problem-solving skills procedures as a soft skill for competitive employment to transition-aged individuals diagnosed with ASD and/or IDD? (b) Can students with ASD and/or IDD use
the learned problem-solving skills procedures to solve novel problems after the researcher withdraws video modeling (VM) intervention in a virtual learning environment? (c) Can students with ASD and/or IDD generalize the use of problem-solving skills procedures in novel settings? (d) Can the use of VM interventions to teach problem-solving skills procedures in a virtual learning environment have desirable effects on student and teacher perceptions?

Participants

This study included four 20-year-old participants, Queen, Sarah, Homer, and Sheeza (Pseudonyms), with a formal primary diagnosis of ASD and/or IDD as indicated in their Individualized Education Programs (IEP). Between three to five participants is a standard single-case design (SCD) practice (Kratochwill et al., 2010). Whereas the study started with five participants, one participant dropped out in the first week, compelling the researcher to destroy the initial data collected from them as per the consent and assent form agreement. Table 3 below gives a summary of the participant demographics. The participants were students in a post-secondary education transition program from where they continue receiving services through the Individuals with Disabilities Education Act (IDEA; 2004) post-high school graduation until they turn 21. The researcher selected the participants to participate in this study through purposive sampling, which is selecting a sample based on defined inclusion criteria (Terrell, 2016) because of its usefulness in allowing researchers to identify small, specific groups to work with (Terrell, 2016). The transition program coordinator at the study location helped the researcher identify the potential participants (five initially) who met the inclusion criteria for the study and affirmed their voluntary involvement.
Table 3

Summary of Study Participants

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Disability Diagnosis</th>
<th>Gender</th>
<th>Race</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queen</td>
<td>20</td>
<td>Intellectual Disability (ID)</td>
<td>Female</td>
<td>White</td>
</tr>
<tr>
<td>Sarah</td>
<td>20</td>
<td>Autism and Attention Deficit Hyperactivity Disorder (ADHD)</td>
<td>Female</td>
<td>White</td>
</tr>
<tr>
<td>Homer</td>
<td>20</td>
<td>Intellectual Disability, Learning Disability (LD), and Anxiety</td>
<td>Male</td>
<td>White</td>
</tr>
<tr>
<td>Sheeza</td>
<td>20</td>
<td>Intellectual Disability (ID)</td>
<td>Female</td>
<td>Asian</td>
</tr>
</tbody>
</table>

**Inclusion Criteria**

The researcher included the four participants in this study because they were (a) between 18-21 years old, (b) registered in a post-secondary education transition program, and (c) able to speak, read and write in basic English language as observed in their IEPs, (d) able to respond to and operate a computer, iPad, or a smartphone (typing or speaking on a computer), and (e) able to follow simple multistep directions including logging into the computer and using the appropriate codes to get into an online class.

**Exclusion Criteria**

The researcher excluded potential participants from this study because they were nonverbal, could not write by typing on the keyboard and/or did not fulfill any of the requirements outlined in the inclusion criteria above.

**Ethical Issues.** In line with the Belmont Report (1979) recommendations, the researcher sought Institutional Review Board (IRB) authorization from Duquesne University to conduct this study with the participants. The researcher upheld to treat the participants ethically by respecting their decisions, protecting them from harm, and respecting their well-being. The researcher
treated the participants with respect by acknowledging their ability to make decisions that affect their well-being throughout the study while protecting those unable to act independently. Potential benefits included improved problem-solving skills and an increased chance of obtaining and maintaining a job. The study did not have any risks to the participants beyond what is experienced in daily activities. The researcher made the participants aware of the purpose of the study and their rights, and they strictly participated following an informed consent declaration of their agreement to participate in the study.

**Location**

The researcher conducted this study in a virtual learning environment/platform at a post-secondary education (PSE) transition program school located within the Duquesne University campus in Pittsburgh, Pennsylvania. Students in the program have a primary diagnosis of ID (i.e., Down's syndrome), ASD, IDD, and other related disabilities (e.g., anxiety, asthma, attention deficit hyperactivity disorder (ADHD), and specific learning disabilities). All the students in the program had graduated from high school by deferring their diploma but had not yet reached 21 years old, so they were having a continuation of services under IDEA (2004). At the program, the students learn functional academics (e.g., reading, math, current events, budgeting, behavioral health, physical education, and mobility training), independent living skills at an off-campus apartment, vocational skills for attaining and retaining employment, and mobility using public transportation in Pittsburgh.

The study location was suitable because it serves a population of students who met this study's inclusion criteria and was easily accessible to the researcher. Moreover, the researcher aligned the purpose of this study with the PSE institution's fundamental goals of preparing students with disabilities for competitive employment opportunities in their communities. The
importance of conducting this study with the PSE transition program school was that by the end of the study, the participants would likely acquire competitive job-related problem-solving skills that would help them to acquire and maintain their jobs in the future. Subsequently, when the participants eventually acquire competitive jobs and maintain them in the future, there might be increased accountability related to Indicator 14 discussed earlier, helping to close the unemployment gap between individuals with ASD or IDD and their peers without disabilities.

The specific room in which the study took place in the location was spacious, away from the class in which the students would typically take their daily lessons. The room was used as a lounge area by the post-secondary education transition program students and college students and included several chairs set around five tables spread across the room, two couches, and two vending machines. Every morning during the study, the students and their job coaches/teachers would meet the researcher in the room and sit around two tables with their Chromebook computers and headphones before the study transitioned to a virtual environment. The researcher sat at the head of the table across from the teacher/job coach. The students sat on either side of the table at the same position daily for ease of intervention delivery.

**Materials**

Materials that the researcher exploited in this study included a MacBook computer, four Chromebook computers (one for each student), headphones, and an iPhone with a working camera and internet connectivity. The MacBook and Chromebook computers installed zoom and Nearpod software applications. Zoom ([https://zoom.us/](https://zoom.us/)) is a free cloud-based video conferencing service that schools have increasingly used during the COVID-19 pandemic to provide education to students virtually, either by video or audio-only, or both. Zoom has several exciting features that make it suitable for use in this study, including that it is free, has live chatting capability, the
ability to record the sessions on the cloud for later viewing, screen-sharing capabilities, and the ability to be integrated with Nearpod (https://nearpod.zendesk.com/hc/en-us/articles/360045016811-Nearpod-Live-Participation-Zoom-Integration). Nearpod is instructional software that engages students with interactive learning experiences (https://nearpod.com/how-nearpod-works). Nearpod allows students to participate in lessons containing videos, virtual reality, 3D objects, and pictures. Nearpod's interactive features empower students through activities like open-ended questions, polls, quizzes, matching exercises, and collaborative boards, among other exciting features. The researcher used Nearpod to present the tasks of this study virtually to the participants by uploading interactive video models and assigning each participant video assessment tasks during each session as appropriate.

Some of the advantages of Nearpod that align with this study’s objectives include its ability to be used independently to allow students to join an online class either synchronously or asynchronously at their own pace or in conjunction with other now typical videoconferencing applications like zoom (https://zoom.us/) for synchronous sessions that may need recording for future reference. Also, the ability to present video content to students in an interactive way, the ability to vary the assessment durations, and lastly, the ability to grade and provide the assessment results almost instantly, thereby eliminating the need for a prolonged interobserver agreement as is common practice in single-subject study designs.

Video Models

The researcher also used video models as materials in this study. The researcher recorded the video models using an iPhone and edited the videos using iMovie software on a MacBook before presenting them to participants during the intervention phase of the study. The video models were in a format accessible via Nearpod through the Chromebooks. The models in the
video were of a similar age and relatable to the participants, so they would deem the modeled actions personally relevant and attainable (Bandura, 1997). Please, see the independent variable description in the following sections, located under research design, for a detailed explanation of the video models.

In addition to all the materials the participants required, the researcher used paper and pencil for recording observations and writing anecdotal notes (i.e., field notes) during the study.

**Research Design**

This study applied a multiple-baseline across participants, single-subject research design (single-case design). Single-subject research design helps evaluate intervention effects on individual cases. Multiple-baseline design is the most frequently used single-case design (Shadish & Sullivan, 2011; Smith, 2012). The design conditions included baseline, intervention, maintenance, and generalization probe phases. Special education personnel commonly use multiple-baseline designs to study intervention effects across multiple participants, behaviors, or settings (Alberto & Troutman, 2013; Coon & Rapp, 2018). Baer et al. (1968) introduced multiple-baseline designs in their seminal paper about some of the current dimensions of applied behavior analysis (ABA). They described it as a technique in which several responses are identified and measured over time to provide a baseline against which to evaluate changes. According to Baer et al. (1968), once a researcher establishes a stable baseline, they can systematically apply an experimental variable to one of the participants whose behavior is measured, producing a change in it while observing whether there is a corresponding change in other baselines or not.

In this study, the researcher established the baseline through a series of observations measuring the subject's problem-solving skill ability before the intervention. After the researcher
had observed a stable baseline across the participants (i.e., level of problem-solving performance before introducing intervention), the researcher presented the VM intervention in a staggered format (Coon & Rapp, 2018).

**Rationale**

The multiple-baseline design was suitable for use in this study because it is easy to conceptualize and use (Cooper et al., 2020), parallels the practice of many teachers in classrooms (Alberto & Troutman, 2013), and offers for generalization of behavior change to be monitored through the design (Richards et al., 2014). Additionally, the design does not require the withdrawal of an effective treatment to demonstrate the functional relationship between the independent and dependent variables (Baer et al., 1968). Baer et al. (1968) recommend its use when the target behavior is irreversible or reversing the behavior may be undesirable. In this study, reversing problem-solving behavior amongst participants would have been unsuitable because it is essential for obtaining and maintaining a competitive employment position. Reversing the problem-solving behavior skills acquired might result in future unemployment or underemployment.

Furthermore, Cooper et al. (2020) suggest that multiple-baselines across participants design are suitable for a condition in which a single behavior or set of behaviors is subject to change or improvement among different participants with similar characteristics. In this study, the participants had similar characteristics given their disability diagnosis (ASD or IDD), transition age, problem-solving skills challenges established at the pre-baseline, and membership in a post-secondary education transition program. Therefore, using multiple-baselines across participants designs allowed the researcher to determine and validate the effectiveness of the VM
intervention with four participants who exhibited the same behavioral needs (i.e., problem-solving needs; Cooper et al., 2020; Kazdin, 2011; Richards, 2018).

**Independent Variable**

The independent variable in this study was the VM of problem-solving skills procedures that employed Wehmeyer, Palmer, et al.'s (2000) three phases of the self-determined learning model (SDLM) of instruction, which involves setting a goal, developing an action plan, and then evaluating progress through self-talk. VM is a method of teaching that uses a video recording and display equipment to demonstrate desired behaviors to a learner before they are allowed to perform the same behavior or its variation immediately or later (Rayner et al., 2009; Bellini & Akullian, 2007).

The researcher used an iPhone with video recording capability and a MacBook with video editing software (i.e., iMovie) to record, edit and produce multiple VM clips. The VM intervention involved a participant watching a video of a peer model demonstrating how to apply a problem-solving skill procedure through self-talk to solve a real work problem by setting a goal (what is the problem?), developing an action plan (how can you fix the problem?), and evaluating progress (What should you do if you cannot solve the problem?). The video model clip embedded only three out of five distinct categories or contexts of work-related problems (i.e., missing material, a broken material, a mismatched material, a complete material, or incomplete/partially complete material). The context situations aligned with Foshay and Kirkley's (2003) recommendation to teach well-structured problem solving as moderately structured and ill-structured problems.

To promote generalization of the problem-solving behavior in the future after the researcher withdraws VM intervention, the researcher contrived modeling in multiple familiar
work environment context situations, used multiple examples, and randomly varied noncritical aspects of the video settings (i.e., taught loosely) as advised by Cooper et al. (2020). After watching the model in the video accomplish the problem-solving tasks, the researcher asked the participants through a video assessment to perform the same behaviors or their variations immediately or later to establish if they had learned the problem-solving skills procedures demonstrated in the video model.

The researcher sought input from participants’ teachers and job coaches who helped identify the everyday tasks the participants have been previously involved in while in the transition program, the participant's goals, interests, preferences, and areas of difficulty. Then, the researcher used that information to determine the work activities to model in the video clips. The researcher found some of this information through an informal interview with participants. In line with some of the best practices recommendations for teaching problem-solving (Foshay & Kirkley, 2003), the researcher endeavored to choose authentic problems the students frequently encountered at on-campus work experience sites (e.g., office, dining, residence hall, and mailing work problems) to include in the video models. Additionally, the behaviors modeled in the videos were moderately structured problems that would encourage the participants to use their declarative knowledge to find a solution that fits the context of the problem (i.e., teach loosely). Subsequently, the researcher recorded, edited, and produced about 15 separate one to two-minute-long video clips modeling problem-solving skill procedures in different problem situations (see Table 4). The researcher created approximately 15 distinct VM clips to avoid participants' likelihood of practice effects during the intervention phase of the study. The 15 one-to two-minute VM clips of problem-solving skill procedures represented the five possible problem categories (i.e., missing, broken, mismatched, complete, and incomplete/partially
complete materials; see Table 4). Therefore, the five possible problem categories had three unique VM clips demonstrating problem-solving skills (i.e., 3 x 5 = 15; see Table 4 below).
**Table 4**

*Content of Video Models for 15 Different Problem Situations*

<table>
<thead>
<tr>
<th>Problem situation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Missing material video model samples</strong></td>
</tr>
<tr>
<td>1. Peter needs to staple and file papers on his desk then send them out to the mailroom. As soon as he sits down to start working, he cannot find a stapler (missing stapler).</td>
</tr>
<tr>
<td>2. Isabella needs to write a letter to her job coach but cannot find a pen on her desk to use (missing pen)</td>
</tr>
<tr>
<td>3. The job coach has asked Naomi to organize papers into a file, but she cannot find any papers to add to the binder (missing papers).</td>
</tr>
<tr>
<td><strong>Broken material video model samples</strong></td>
</tr>
<tr>
<td>1. Your task is to print labels to use in the mails, but the printer is not working (Broken Printer).</td>
</tr>
<tr>
<td>2. Robert starts to push the cart with mails to be delivered, but the cart is not moving (Broken cart wheel).</td>
</tr>
<tr>
<td>3. Joan a server goes to refill a glass of water at the table when she finds the glass cracked (Broken Glass)</td>
</tr>
<tr>
<td><strong>Mismatched material model samples</strong></td>
</tr>
<tr>
<td>1. Jane’s job coach asks John to wipe the surfaces in the office using a disinfectant spray. He is, however, given a water spray bottle.</td>
</tr>
<tr>
<td>2. Jaqueline a server notices when she goes to fill a glass with water there is a coffee mug on the table instead of a glass.</td>
</tr>
<tr>
<td>3. Joan has been assigned to work at a table as a busser by the supervisor, but her name appears on the list as a cashier.</td>
</tr>
<tr>
<td><strong>Complete material model samples</strong></td>
</tr>
<tr>
<td>1. Michael has been asked to deliver mail to Canevin Hall. He checks to confirm if all the letters are addressed to go to Canevin Hall. All the letters are addressed to Canevin.</td>
</tr>
<tr>
<td>2. The job coach asks Paul to replace the trash bag in the office. The trash bag is empty and clean</td>
</tr>
<tr>
<td>3. Paul a busser at a restaurant has been asked by the manager to clear/bus table number 19 but when he gets there, the table looks very neat with everything in place as it had been cleared by one of the servers.</td>
</tr>
<tr>
<td><strong>Incomplete/Partially complete material model samples</strong></td>
</tr>
<tr>
<td>1. After a long day of sweeping floors, Peter’s supervisor calls him to inform him about spaces that he might not have cleaned.</td>
</tr>
<tr>
<td>2. Joan is asked to confirm that each table has a butter knife. Joan finds out that none of the tables have a butter knife.</td>
</tr>
<tr>
<td>3. Jess has been asked to put the 10 packages addressed to Canevin Hall on the cart for delivery. However, 2 packages are already on the cart.</td>
</tr>
</tbody>
</table>
The researcher then randomly picked three VM clips from three of the five problem categories and then combined them to produce an approximately six-minute-long VM clip that they presented to participants during the intervention phase of this study. There were five distinct six-minute-long VM clips that the researcher showed to participants in random order during the intervention sessions of this study (see Table 5 below). Each of the five six-minute-long VM clips comprised three brief one to two-minute-long VM clip scenes. Each of the three one to two-minute-long VM clip scenes demonstrated how a peer model employed the requisite problem-solving skill procedures (i.e., problem identification, problem solution, and what to do if they cannot solve the problem independently). The researcher developed the three one to two-minute-long VM clips from three out of five possible problem situations (i.e., missing, broken, complete, mismatched, or incomplete/partially complete). Table 5 outlines an example of a VM sequence for each of the five different six-minute-long VM clips participants watched during intervention sessions. The researcher showed participants one of the five separate six-minute-long VM clips once during each intervention session without showing any of them in consecutive sessions.
### Table 5

**Examples of Intervention Video Modeling Sequence**

<table>
<thead>
<tr>
<th>VM Clip</th>
<th>Scene 1 (1-2 minutes)</th>
<th>Scene 2 (1-2 minutes)</th>
<th>Scene 3 (1-2 minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Missing</td>
<td>Broken</td>
<td>Mismatched</td>
</tr>
<tr>
<td></td>
<td>Peter needs to staple and file papers on his desk and then send them out to the mailroom. As soon as he sits down to start working, he cannot find a stapler.</td>
<td>Your task is to print labels to use in the mails, but the printer is not working.</td>
<td>Jane’s job coach asks John to wipe the surfaces in the office using a disinfectant spray. He is, however, given a water spray bottle.</td>
</tr>
<tr>
<td>2</td>
<td>Complete</td>
<td>Incomplete/Partially Complete</td>
<td>Missing</td>
</tr>
<tr>
<td></td>
<td>Michael has been asked to deliver mail to Canevin Hall. He checks to confirm if all the letters are addressed to go to Canevin Hall. All the letters are addressed to Canevin.</td>
<td>After a long day of sweeping floors, Peter’s supervisor calls him to inform him about spaces that he might not have cleaned.</td>
<td>Isabella needs to write a letter to her job coach but cannot find a pen on her desk to use (missing pen)</td>
</tr>
<tr>
<td>3</td>
<td>Broken</td>
<td>Mismatched</td>
<td>Complete</td>
</tr>
<tr>
<td></td>
<td>Robert starts to push the cart with mail to be delivered, but the cart is not moving (Broken cart wheel).</td>
<td>Jaqueline, a server, notices when she goes to fill a glass with water, there is a coffee mug on the table instead of a glass.</td>
<td>The job coach asks Paul to replace the trash bag in the office. The trash bag is empty and clean.</td>
</tr>
</tbody>
</table>
Table 5 continued

<table>
<thead>
<tr>
<th>VM Clip</th>
<th>Scene 1 (1-2 minutes)</th>
<th>Scene 2 (1-2 minutes)</th>
<th>Scene 3 (1-2 minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Incomplete/Partially Complete</td>
<td>Missing</td>
<td>Broken</td>
</tr>
<tr>
<td></td>
<td>Joan is asked to confirm that each table has a butter knife. Joan finds out that none of the tables have a butter knife.</td>
<td>The job coach has asked Naomi to organize papers into a file, but she cannot find any papers to add to the binder.</td>
<td>Joan, a server, goes to refill a glass of water at the table when she finds the glass cracked (Broken Glass)</td>
</tr>
<tr>
<td>5</td>
<td>Mismatched</td>
<td>Complete</td>
<td>Incomplete/Partially Complete</td>
</tr>
<tr>
<td></td>
<td>Joan has been assigned to work at a table as a busser by the supervisor, but her name appears on the list as a cashier.</td>
<td>Paul, a busser at a restaurant, has been asked by the manager to clear/bus table number 19 but when he gets there, the table looks very neat with everything in place as it had been cleared by one of the servers.</td>
<td>Jess has been asked to put the 10 packages addressed to Canevin Hall on the cart for delivery. However, 2 packages are already on the cart.</td>
</tr>
</tbody>
</table>

Each five distinct six-minute-long VM clip constituted three scenes out of the 15 possible problem-solving situations outlined in Table 4. The flow diagram below (Figure 3) visually summarizes the process followed by the researcher in creating the five final six-minute-long VMs described above. The figure shows how the researcher mixed and matched the 15 initial one to two-minute-long VMs to create the five separate six-minute-long VMs, constituting three out of five different problem-solving scenarios. The researcher used the five final VMs during the study's intervention stages.
A summary Flow Chart of Creating Five Video Models

Video Modeling Procedures

Each VM clip from a series of five different six-minute-long VM clips (see Table 5 above) began with an introduction stating, “Problem-solving is a skill that will help you to keep a job. The following videos will teach you how to identify a work problem, how to solve the work problem, and what to do if you cannot solve it on your own. To solve a problem, you need to ask yourself three questions. (1) What is the problem? (2) How can I fix the problem (3) What should I do if I cannot fix the problem alone?”

Then, a video model demonstrated the problem-solving skill procedures for all three (e.g., broken, mismatched, and complete) out of five (e.g., missing, broken, mismatched, complete, and incomplete/partially complete) problem scenarios (see Table 5 above). For
example, the first scene (i.e., broken) out of three (i.e., broken, mismatched, and complete) in one of the five VM clips (VM clip 3) progressed as outlined below.

Peer model: “I start to push a cart to deliver mail, but the cart is not moving because its wheel is broken. This is how I solve the problem.”

i. “To show that I know the problem, I ask myself, what is the problem?”

[“Is the problem a working cart? NO. Is the problem a broken cart wheel? YES, the problem is a broken cart wheel.”]

ii. “To determine how I can fix the problem, I ask myself, how can I solve the problem?”

[“Can I stop delivering the mail? NO. Can I fix the broken cartwheel? YES, I should try to fix the broken cart wheel to solve the problem.”]

iii. “To know what I should do if I cannot solve the problem on my own, I ask myself, what should I do if I cannot fix the broken cartwheel?”

[“Can I stop working? NO. Can I ask for help from my Job Coach to fix the broken cartwheel? YES, I should ask for help to solve the problem”]

* Peer model then calls out a job coach, e.g., “hey Mackenzie, can you please help me fix the broken cart wheel?”

The remaining two scenes (i.e., mismatched and complete) followed the same pattern outlined above for the six-minute video model demonstration. A text screen also appeared in the videos when the model asked the questions “What is the problem?”, “How can I fix the problem” and “what should I do if I cannot fix the problem on my own.” The text screen reinforced the demonstration of the problem-solving skill procedure that the participants observed in the video.
Dependent Variable

The dependent variable in this study was the participant's number of correct responses to problem-solving skills procedures across conditions per session. Problem-solving skill procedures constituted the participant accurately identifying a work-related problem presented, finding a possible solution, and explaining what they would do if they could not solve the problem independently. The researcher presented the participants with three distinct problem-solving scenarios in each study session. In each problem-solving scenario, there were three questions relating to problem identification (what is the problem?), problem's solution (how can you solve the problem?), and what to do when unable to solve a problem independently (What should you do if you cannot solve the problem?). In total, there were nine questions (i.e., three questions per video scene) participants were required to answer to demonstrate their number of correct responses to the problem-solving skills procedure per session. If the participant responded correctly to one of the questions, the researcher would award them one point. The researcher would award them nine points if they answered correctly to all nine questions in the three scenarios. The assumption was that using a VM intervention that utilized the SDLM of instruction (Wehmeyer, Palmer, et al., 2000) would help the students to acquire the necessary skills required to identify a problem, solve a problem, and determine what to do if they cannot solve the problem on their own.

Problem Identification (What is the problem?)

This question required a participant to demonstrate their ability to observe a work-related problem situation and then respond verbally or in writing about the correct identity of the problem in the given video scenario (or contrived work situation). The response about the problem's identification must have matched the situation depicted in the given video scenario (or
in a contrived work situation) for the researcher to have awarded a point (one point) for the correct response. For example, when they were in the process of working a job that required stapling papers, then the staples ran out. Hence, they could not continue stapling the papers. The correct response (problem identification) about what the problem was would have been, "the staples have run out" or "no staples in the stapler." An incorrect response would have been the student responding that "there is no food" or "I do not know," etc. Participants had three opportunities to identify a problem situation during each study session. Each opportunity to respond was equivalent to one point – implying if the student correctly identified all three problem situations in a session, they would be awarded three total points out of nine possible points per session.

**Problem-Solving (How can you solve the problem?)**

This question required a participant to demonstrate their ability to verbalize or write what action they would take to overcome a problem they identified in the video scenario (or in a contrived work situation). The participant's problem-solving response must have matched the problem situation previously identified in the video scenario (or in a contrived work situation) for the researcher to have awarded a point (one point) for the correct response. For example, when they were working a job requiring stapling papers, then the staples ran out, the correct response would have been, "I will get more staples." An incorrect answer would have been the student responding, "I will stop working," or "I will cry," etc. Participants had three different opportunities to answer how they would have solved a work-related problem during each study session. Each opportunity to respond was equivalent to one point – implying if the student correctly answered how they could solve all three problem scenarios in a session, they would earn three total points out of nine possible points per session.
What to Do When Unable to Solve a Problem (What should you do if you cannot solve the problem?)

This question required a participant to demonstrate their ability to answer verbally or in writing what action they would take if they did not have a solution to a problem they had previously correctly identified in a given video scenario (or in a contrived work situation) but could not solve independently. In addition, the participant's response must have correctly matched the problem situation in the video scenario (or in a contrived work situation) for the researcher to have awarded a point (one point) for the correct response. For example, "I will ask for help from my job coach." would have been a correct response if a problem existed (e.g., for missing material, broken material, mismatched material, and incomplete/partially complete material), but they could not determine its solution independently. On the contrary, "I will ask for help from my job coach" as a response to a "complete" work situation in which no problem existed to solve would have been incorrect. A correct answer, in this case, would have been "There is no problem," "I see no problem," or "nothing." An incorrect response would have been, "I will stop working." Each participant had three different opportunities to outline what they would do if they could not solve a problem independently during each study session. Each opportunity to respond was equivalent to one point – implying if a participant correctly articulated what they would do in three problem scenarios that they could not solve independently during a session, they would earn three total points out of nine possible points per session.

Measuring Dependent Variables. The instruments the researcher used to measure the dependent variables included the problem-solving situation baseline measure, problem-solving situation intervention measure, problem-solving situation maintenance measure, and problem-
solving situation generalization measure outlined below. The researcher standardized the measuring instruments by following the process outlined under the "reliability of the measurements" below. Additionally, the researcher measured the dependent variable using event-based recording techniques, i.e., the rate/number of correct responses to problem-solving skills procedures (problem identification, problem-solving, and figuring out what to do when unable to solve a problem on their own) per session (Cooper et al., 2020; Richards, 2018). Cooper et al. (2020) define the rate of occurrence of behavior as the number of responses per unit of time, and in this study, the researcher measured the participant's number of correct responses to problem-solving skills procedures per session.

While Cooper et al. (2020) warn against using rates to measure behaviors that occur within discrete trials, the researcher believed that the problem-solving skills situations contrived in this study were highly likely not to be opportunity bound as the participants would easily encounter them more than once at work. Besides, the suitability of an event-based recording system in this study was validated by its ease of application and suitability when students respond orally or in writing (Cooper et al., 2020). Furthermore, the event-based recording was easier to apply in this study because there was a permanent record of the participant's responses on Nearpod that the researcher reviewed after each session.

**Measures**

The researcher developed and used five different problem-solving measures in this study adopted and modified from Glago's (2005) and Cote's (2011) studies about problem-solving. The measures included a problem-solving questionnaire (pre and post), problem-solving situation baseline measure (video assessment with five sequences), problem-solving situation intervention measure (video assessment with five sequences), problem-solving situation maintenance measure
(video assessment with five sequences), and problem-solving situation generalization measure. The researcher also used a Likert scale-type questionnaire to measure social validity, as described below. All five sequences of baseline, intervention, and maintenance video assessment measures had similar yet mixed and matched three out of five problem scenarios (i.e., missing, broken, mismatched, complete, and incomplete/partially complete materials; See Appendices E, F, and G). In addition, the researcher sequentially and deliberately presented each video assessment during each phase (i.e., baseline, intervention, and maintenance) unpredictably to prevent memorization and practice effects (See Appendices E, F, and G). A description of each of the measures is below.

**Problem-Solving Questionnaire**

The researcher administered a problem-solving questionnaire pre-and post-treatment. The questionnaire was adopted and modified from Glago's (2005) dissertation study to measure the participant's knowledge of problem-solving skills. The researcher developed this questionnaire using Qualtrics software (https://www.qualtrics.com/). The questionnaire had five open-ended questions, including what is a problem? Can you name a problem at work? How can you fix the problem? Did it work? Did you ask for help?

The purpose of the questionnaire was to qualitatively determine a participant's knowledge of problem-solving and their ability to identify a work-related problem and its possible solutions before and after the study. Each participant responded to the questionnaire once before and after the study concluded. The responses obtained before the study determined the amount of time and resources the researcher allocated to teaching problem-solving skills and strategies to the participants and what to include in the VM demonstration and video assessment. On the other hand, the researcher analyzed the participant's responses to the questionnaire after the study to
determine if the participants had learned the problem skills strategies targeted in this study. A sample questionnaire is in Appendix D.

**Problem-Solving Situation Baseline Measure**

The researcher used this video assessment to determine each participant's baseline performance in problem-solving skills (i.e., dependent variable) before the researcher introduced a VM intervention (i.e., independent variable). Hence, this video assessment generated quantitative data about each participant's number of correct responses to problem-solving skills procedures in a virtual learning environment/platform before VM intervention. In addition, the researcher sequentially presented one of five problem-solving situation baseline measures (Appendix E) to each participant once in each study session during the baseline phase. Therefore, the researcher assessed the four participants using the problem-solving situation baseline measure five, eight, 11, and 14 times each for about 18 minutes per session for the entire study period. The number of times the researcher administered the assessment depended on the consistency or variability of the observed data patterns.

The measure, adapted and modified from Glago's (2005) dissertation study, constituted an approximately six-minute-long video clip comprising three scenarios lasting about one to two minutes depicting different work-related problems organized into three categories. The three categories included a video showing either a missing material, a broken material, a mismatched material, a complete material, or an incomplete/partially complete material (i.e., three problem sets). The participants watched the three video clip scenarios and then responded to three questions at the end of each video scenario (about four minutes per scenario). While the questions were similar to those in the rest of the assessments (i.e., intervention, maintenance, and generalization measures), the researcher modified them to avoid inadvertently teaching the
problem-solving skill procedures before introducing the independent variable (i.e., VM intervention). The modified questions included: (1) "what do you notice?" (Instead of "what is the problem?") (2) "What should happen? (Instead of "how can I fix the problem?") (3) what if it does not happen? (Instead of "what should I do if I cannot fix the problem alone?").

The participants had approximately four minutes to answer the three questions at the end of each of the three scenarios in the video assessment clip by typing their responses using a keyboard or speaking into the onscreen microphone. For a participant who spoke into the onscreen microphone, Nearpod transcribed their speech into text before they posted/published it for recording. Each question in the video assessment constituted one point. Therefore, if participants correctly answered all the three questions in a video scenario, they were awarded three points. In addition, if they correctly answered all the three questions for each of the three video scenarios in a session, the researcher considered them to have demonstrated a maximum correct response rate (100%) to problem-solving skill procedures (i.e., nine problem-solving skills per session). Appendix E shows a sample of problem-solving situations in the five baseline video assessment sequences.

**Problem-Solving Situation Intervention Measure**

The researcher used this video assessment to determine each participant's performance in problem-solving skills (i.e., dependent variable) after introducing a VM intervention (i.e., independent variable). This video assessment generated quantitative data about each participant's number of correct responses to problem-solving skills procedures (i.e., dependent variable) in a virtual learning environment/platform following VM intervention (i.e., independent variable). The researcher sequentially presented one of five problem-solving situation intervention measures (Appendix F) to each participant once in each study session during the intervention.
phase after watching a VM demonstration of problem-solving skill procedures. Therefore, the researcher assessed the four participants using the problem-solving situation intervention measures 13, 10, seven, and four times each for about 18 minutes per session for the entire study period. The number of times the researcher administered the assessment was dependent on the consistency or variability of the observed data patterns.

This measure constituted an approximately six-minute-long video clip comprising three scenarios lasting about one to two minutes depicting different work-related problems organized into three of five categories. Like the baseline measures (see above), the researcher purposefully arranged the three video scenarios across each of the five intervention measures sequences to avoid memorization. The three categories in each intervention measure included a video scenario depicting either a missing material, a broken material, a mismatched material, a complete material, or incomplete/partially complete material (i.e., three out of five problem sets). The participants watched the three distinct video scenarios and then responded to three questions at the end of each video scenario (about four minutes per segment).

The questions included: "What is the problem?", "How can I fix the problem?" and "what should I do if I cannot fix the problem alone?". The participants responded to the questions by typing their responses using a keyboard or speaking into the onscreen microphone. For a participant who spoke into the onscreen microphone, Nearpod transcribed their speech into text before they posted/published it for recording. Each question in the video assessment constituted one point. Therefore, if participants correctly answered all the three questions in a video scenario, they were awarded three points. If they correctly answered all the three questions for each of the three video scenarios in a session, the researcher considered them to have demonstrated a maximum correct response rate (100%) to problem-solving skill procedures (i.e.,
nine problem-solving skills per session). Appendix F shows a sample of problem-solving situations in the five intervention video assessment sequences.

**Problem-Solving Situation Maintenance Measure**

Similar in format to the problem-solving situation baseline and intervention measures described above and purposefully arranged three out of five video clip scenarios to prevent memorization, the researcher used this assessment to establish if the participants would maintain the modeled problem-solving skill behavior following the withdrawal of VM intervention (i.e., independent variable). Maintenance refers to the participant's ability to continue exhibiting the problem-solving skill procedures capability (i.e., dependent variable) learned through VM following the termination of the VM intervention (i.e., independent variable). This video assessment generated quantitative data about each participant's number of correct responses to problem-solving skills procedures (i.e., dependent variable) in a virtual learning environment/platform one week after VM intervention (i.e., independent variable) withdrawal. The researcher presented the problem-solving situation maintenance measure to each participant twice, one week after the VM intervention was withdrawn. Therefore, the researcher assessed the participants using the problem-solving situation maintenance measures twice, each for about 18 minutes per session on separate days/sessions for the entire study period.

Each question in the video assessment constituted one point. Therefore, if participants correctly answered all the three questions in a video scenario, they were awarded three points. In addition, if they correctly answered all the three questions for each of the three video scenarios in a session, the researcher considered them to have demonstrated a maximum correct response rate (100%) to problem-solving skill procedures (i.e., nine problem-solving skills per session). A sample of problem-solving situations that were in each of the five maintenance video assessment
Problem-Solving Situation Generalization Measure

Unlike the three instruments described above, this instrument was not a video assessment. Instead, it was a verbal assessment following direct observation by a participant's teacher/job coach while the participant accomplished various job tasks in a contrived actual work scenario. This assessment provided data to determine whether participants could generalize the learned problem-solving skills (i.e., dependent variable) to a new environment. Generalization refers to the participant's ability to exhibit the learned problem-solving skill procedures over time in a different environment from where the skills are taught and across various related work behaviors (Baer et al., 1968). This assessment generated quantitative data about each participant's number of correct responses to problem-solving skills procedures (i.e., dependent variable) in an actual work situation following the withdrawal of VM intervention (i.e., independent variable). The researcher presented the problem-solving situation generalization measure to each participant in one session that lasted about 15 minutes in an actual work location following the study's maintenance phase conducted in a virtual learning environment/platform.

This assessment consisted of three prearranged work scenarios: a missing material, a broken material, a mismatched material, a complete material, or an incomplete/partially complete material (i.e., problem sets). The observer (job coach) verbally asked a participant three assessment questions when they encountered either of the three prearranged work scenarios (i.e., what is the problem? How can you fix the problem? and what should you do if you cannot solve the problem yourself?). Each question in the verbal assessment constituted one point. Therefore, the researcher awarded the participants three points if they correctly answered all three questions in a prearranged work scenario. In addition, if they correctly answered all the three questions for
each of the three prearranged work scenarios in a session, the researcher considered them to have demonstrated a maximum correct response rate (i.e., 100%) to problem-solving skill procedures (i.e., nine problem-solving skills per session). A sample of problem-solving situations participants encountered in an actual job experience position is in Appendix H.

**Reliability of Measurement.** The reliability of a measure is its ability to yield identical scores across repeated measures of the same event (Cooper et al., 2020). Therefore, the researcher conducted an Interobserver Agreement (IOA) for all three questions relating to the five problem situations (see Appendix I) to guarantee the reliability of problem-solving measures. The IOA process began with the researcher giving a sample of the five problem situations to three age-appropriate peers to respond to the 15 questions (i.e., 5 problems x 3 questions = 15). Then, in collaboration with a trained reviewer, the researcher conducted an IOA for 100% of the questions by dividing the total number of agreements by agreements plus disagreements and multiplying by 100% (Ledford et al., 2018). Whereas the researcher would have considered an IOA greater than 90% across the three sample student responses to represent high reliability for the measures used (i.e., at baseline, intervention, maintenance, and generalization phases; Horner et al., 2005), the researcher endeavored to achieve an IOA of 100% across all problem situation questions. In case of a disagreement, the researcher and the second trained reviewer discussed and repeated the process until they found a suitable response they agreed on through deliberations about what constituted a correct response (Komaki, 1998). Eventually, there was 100% agreement about the possible correct responses before the study commenced.

**Social Validity Measures**

**Participant Questionnaire.** The researcher interviewed the participants virtually at the
end of the study through a three-point Likert Scale questionnaire adopted from the social validity survey used by Horn et al. (2020) to evaluate the participant's perception of the intervention (see Appendix J). The researcher developed and shared the questionnaire using Qualtrics software (https://www.qualtrics.com/). The researcher restated or modified the questions with the help of observers (teacher or job coach) for a participant that had difficulty comprehending them. Some examples of the questions that students answered included:

- I enjoyed learning about problem-solving online on a computer or using my phone.
  - Agree – Disagree – Neutral
- I learned about what a problem is by watching the video.
  - Agree – Disagree – Neutral
- I learned how to solve problems after watching the videos.
  - Agree – Disagree – Neutral
- I enjoyed watching the video models to solve work problems.
  - Agree – Disagree – Neutral
- I would like to watch video models to learn something new.
  - Agree – Disagree – Neutral
- I think other people would learn by watching video models.
  - Agree – Disagree – Neutral

**Observer Questionnaire.** Additionally, the researcher sought feedback from the observers (teachers or job coaches) about their perceptions using a social validity measure at the end of the study (see Appendix J). The researcher developed and shared the questionnaire using Qualtrics software (https://www.qualtrics.com/). The questions to the observers (teachers or job coaches) were on a three-point Likert-type scale. The questions evaluated the observer's
perceptions of VM intervention to teach problem-solving skills in a virtual learning environment/platform and their comfort level in teaching using the same strategies applied in this study. Examples of questions included:

- The strategies implemented in this study were fairly easy to implement.
  - Agree – Disagree – Neutral

- I believe that problem-solving skills are important to teach to my students.
  - Agree – Disagree – Neutral

- I am likely to use the strategies used in this study in teaching problem-solving skills to my students in the future.
  - Agree – Disagree – Neutral

- Video modeling was effective in teaching students to problem solve in a virtual learning environment/platform.
  - Agree – Disagree – Neutral

- The intervention was feasible in the amount of time required to teach it.
  - Agree – Disagree – Neutral

- The intervention (video modeling) was appropriate for the student's ability levels.
  - Agree – Disagree – Neutral

- I feel comfortable teaching problem-solving skills using video modeling in a virtual learning environment/platform.
  - Agree – Disagree – Neutral

- I will continue to use the strategies to teach my students post-study.
  - Agree – Disagree – Neutral
**Reliability Checks**

Reliability checks in single-subject research designs are essential as they help buttress believability and confirm the study's consistencies that may be fit for generalization (Cooper et al., 2020). Therefore, the researcher conducted reliability checks to control for the internal and external validity threats throughout this study (i.e., 100% of the baseline, intervention, and maintenance sessions).

**Internal Validity**

Internal validity refers to the degree to which the researcher adequately controlled the variables in this study (independent, dependent, and extraneous variables) to establish the believability of the functional relationship that might have arisen and, therefore, demonstrate confidence in the results and conclusions that they might draw (Richards et al., 2014). The researcher accounted for internal validity through the study design, operationally defining the dependent variables, intervention fidelity (observer training, participant training, and checklists), Interobserver Agreements (IOA), controlling for extraneous variables, and controlling for participant reactivity.

**Study Design.** Prediction, verification, and replication are key for reliability and internal validity in single-subject research designs (Richards et al., 2014). Multiple-baselines across participants design in this study incorporated the critical elements of prediction (collecting baseline data), verification (introducing the intervention at separate times), and replication (by including four participants). The researcher not only presented the VM intervention deliberately (Horner et al., 2005; Kratochwill et al., 2012), but they also introduced treatment in a staggered format making it easier to rule out history-related threats (Kazdin, 2011; Kratochwill & Levin, 2010) hence fulfilling internal validity requirements. Additionally, Horner et al. (2005) suggest
that a design should include at least three replications of the effect of an independent variable on a dependent variable as a quality indicator for the study's internal validity. There were four replications of the effect of independent variables, given that four participants participated in this study, fulfilling Horner et al.'s (2005) recommendation.

**Defining the Behavior.** The researcher adequately described the dependent variables in this study (see the section about the dependent variable above) to enhance the internal validity so that there were no disagreements as to what should have been measured (dependent variables) and to avoid observer drift (Horner et al., 2005). Moreover, defining the target behavior well (operationally defining) helped prevent confusion as to whether or not a participant exhibited the correct problem-solving skill rate (For the operational definitions of the target behaviors, please refer to the section about dependent variables above).

**Intervention Fidelity.** A researcher should establish intervention fidelity to control for internal validity (Gersten et al., 2005). Intervention fidelity is the degree to which the researcher delivered the prearranged elements of the study intervention and avoided unplanned elements (Waltz et al., 1993) so that the study's findings would be believable and suitable for future generalizations. In this study, the researcher ensured that intervention fidelity was adhered to by training the participants and observers (teachers and job coaches) and developing checklists for study implementation for the study's baseline, intervention, maintenance, and generalization phases. Observer training and participant training procedures are outlined below in this paper's data collection procedures section.

**Checklists.** To ensure fidelity of implementation of the intervention without the observer's drift, the researcher developed three separate checklists. The first checklist was for conducting observer's training (see Appendix L), the second was for conducting participant
training (see Appendix N), and the third checklist outlined the study implementation procedure, including do's and don'ts (see Appendix P). The researcher used the checklists in 100% of the sessions to ensure that the observers (job coaches and teachers) adhered to the outlined study procedures.

**Inter Observer Agreement (IOA).** According to Horner et al. (2005), an IOA of 80% or better should be considered a study quality indicator. The researcher conducted an IOA across 60% of the study sessions (i.e., 30% baseline sessions, 50% intervention sessions, and 100% maintenance sessions). While the Nearpod app recorded the student responses through its formative assessment features once they spoke into the onscreen microphone or typed their answers and submitted them for access by the researcher and observer as a permanent product, the researcher downloaded the report and shared it with one trained observer with whom they determined the IOA after each session. Then, they filled out a form (see Appendix A) with answers that they agreed (+) or disagreed (-) about the correctness before awarding the participant the correct performance scores to record in an excel sheet. Disagreements in scoring the correct performance of target behaviors during study implementation between observers were reviewed and discussed. In case of a dispute about the correct response, the researcher used the initially agreed upon correct answers (see Appendix I) to reconcile the acceptable participant response. Finally, the researcher calculated the IOA by dividing the total number of agreements by agreements plus disagreements, multiplied by 100 (Ledford et al., 2018). Table 6 below summarizes the IOA across 60% of the study sessions.
Table 6

Summary of IOA across the sessions

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Intervention</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOA (M)</td>
<td>81%</td>
<td>93%</td>
<td>96%</td>
</tr>
<tr>
<td>Range</td>
<td>63%–92%</td>
<td>86%–97%</td>
<td>95%–97%</td>
</tr>
</tbody>
</table>

**Controlling for Extraneous Variables.** The researcher strived to control for extraneous variables in this study by training observers, using checklists, implementing all the study sessions at the designated time, and conducting occasional observer retraining or booster sessions. Also, by routinely completing fidelity checks (i.e., writing down a list of steps involved in implementing the various study sessions and recording whether teachers or job coaches delivered each step correctly) to minimize observers' drift, as recommended by Cooper et al. (2020).

**Controlling for Participant Reactivity.** During participant training (see the section on participants training below), the researcher aimed to control participant reactivity (i.e., participant altering their behavior as a response to being observed; Haynes, 1978; Kazdin, 1982) by carrying out an actual practice observation in the experimental setting (virtual learning environment with the students) and by involving teachers and job coaches that the students are familiar with in the study as observers. The researcher also controlled reactivity when the study commenced by extending the baseline measurements until they observed a stable baseline (Richards et al., 2014).

**External Validity**

External validity refers to the degree to which a researcher may have confidence that other researchers might obtain the same or similar results in the future if they followed the same procedures outlined in this study with other individuals with ASD and/or IDD diagnosis in
different settings (Richards et al., 2014). The researcher accounted for external validity in this study in different ways, including through the study design, by adequately describing the study participant characteristics, study setting, independent variables, dependent variables, phases of the study, and implementation procedures (Richards et al., 2014) as already discussed in other sections of this paper and also by collecting data related to social validity as discussed below.

**Social Validity.** Social validity relates to the proof that both the intervention (VM) and target behavior (problem-solving skill) that the researcher has chosen for change are not only functionally related, but they are also socially relevant and that the outcomes are important to the persons whose behavior the study targets, their families, and their communities (Wolf, 1978). When this happens, it will improve the acceptability of the intervention and provide more opportunities for future replication and generalization. The researcher accounted for social validity in this study by involving the participants and observers (teachers and job coaches) in selecting work-related problem skills that they considered important for the participants to obtain and maintain competitive employment in their communities. The researcher also ensured social validity through the fidelity of implementation of the study procedures as outlined by the procedure and checklists discussed above and by the participants and observers reporting about their acceptability of the study (Horner et al., 2005). At the end of the study, the researcher administered a social validity measure described under the “measures” above (see Appendix J).

**Data Collection Procedures**

This section summarizes the procedures the researcher followed in implementing and collecting data for this study. The figure below (Figure 4) summarizes the researcher's procedures in this study.
The study lasted 12 weeks, with four weeks of pre-intervention phase, four weeks of baseline and intervention phases, two weeks of maintenance and generalization, and about two weeks of data analysis. See Table 7 for a summary of study timelines and duration.
### Table 7

*Study Timelines and Duration*

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>Number of sessions/days</th>
<th>Approximate Timeline</th>
</tr>
</thead>
</table>
| 1. Pre baseline | Entry into the study location.  
Participant selection, review of documents, creating awareness about the study, and signing informed consent procedures.  
Video recording and editing. | 7 Days                  | 4 weeks              |
|             | Observer training                                                           |                         |                     |
|             | Participant training                                                        | Five 30-minute sessions for 1 Week (5 days) |                     |
|             | Participant training                                                        | Five 30-minute sessions for 1 Week (5 days) |                     |
| 2. Baseline | Participant 1                                                                 | 5                       |                     |
|             | Participant 2                                                                 | 8                       |                     |
|             | Participant 3                                                                | 11                      |                     |
|             | Participant 4                                                                | 14                      |                     |
| 3. Intervention | Participant 1                                                                 | 13                      | 4 weeks             |
|             | Participant 2                                                                 | 10                      |                     |
|             | Participant 3                                                                | 7                       |                     |
|             | Participant 4                                                                | 4                       |                     |
| 4. Maintenance | Participant 1                                                                 | 2                       |                     |
|             | Participant 2                                                                 | 2                       |                     |
|             | Participant 3                                                                | 2                       |                     |
|             | Participant 4                                                                | 2                       |                     |
| 5. Generalization | Participant 1                                                                | 1                       | 2 weeks             |
|             | Participant 2                                                                 | 1                       |                     |
|             | Participant 3                                                                | 1                       |                     |
|             | Participant 4                                                                | 1                       |                     |
| 6. Data analysis | Visual (i.e., level, trend, variability, immediacy of effect, overlap & consistency of data patterns), Descriptive Statistics & Qualitative |                         | 2 weeks             |
**Pre-Intervention Phase**

The pre-intervention phase began after Duquesne University's Institutional Review Board (IRB) authorization. It included entry to the study location, identification and recruitment of participants, record review, interviews, and training of both observers and participants. This phase lasted about four weeks. First, the researcher met with the transition program coordinator at the study location and then expressed their intent to conduct a study in a virtual learning platform with students registered at the postsecondary education program location. The researcher then elucidated the purpose of the study and its rationale (i.e., how it would benefit the participants) at this stage.

**Recruiting Participants.** Through a transition program coordinator, the researcher asked for the teacher's/job coach's help to identify three to five participants who met the outlined inclusion criteria for this study (i.e., purposive sampling; Terrell, 2016). The researcher provided the transition program coordinator with a letter about the study (see Appendix B) to disseminate to parents or caregivers of the potential participants. As a result, five parents contacted the researcher about their willingness to let their children participate in the study. The identified participant's parents/guardians signed a parental permission form (see Appendix C) to authorize their child's participation before the participants affirmed their voluntary participation in the study by signing an assent form. After parental permission and informed assent declaration, the researcher informally interviewed teachers, parents, and job coaches about the participants and their interests related to competitive employment. The researcher then administered the pre-treatment problem-solving questionnaire outlined earlier (see Appendix D) to measure participants' knowledge of problem-solving skills. The researcher assigned pseudonyms to maintain the participants' anonymity. Further, the researcher developed a demographic data form
(see Table 3 above) to keep track of the participants (i.e., age, sex, disability, and race).

After identifying each participant's job interests and knowledge about problem-solving through record reviews, interviews, and the pre-treatment problem-solving questionnaire, the researcher started recording video clips (assessment video clips and VM clips) that the researcher and observers presented to participants at various stages of this study (i.e., baseline, intervention, and maintenance).

Training of Observers. At pre baseline, the researcher trained three teachers and two job coaches (observer trainees) about the importance of this study and their role in supporting the students in and out of a virtual learning environment/platform as observers and about the study implementation process. The observer training was conducted in person in a group format, lasted five days, and was about 30 minutes per session. Specifically, the researcher taught the observer trainees about technology use (Nearpod and Zoom), the independent (VM) and dependent variables (problem-solving skills), and how to score the IOA.

First, the researcher taught the observers how to access and use technology in this study (i.e., Nearpod and zoom). Access included a demonstration of how to log into both apps using personal emails, join a Nearpod lesson using the code the researcher provided for both student-paced and teacher-paced lessons, and how the Nearpod application worked for live formative and continuing assessments. During this phase of training, the observers also watched a sample video assessment on Nearpod and learned how to respond to open-ended questions relating to problem-solving either by typing using the keyboard or by using the speech-to-text dictation feature on the screen that would record the audio, then transcribe it before they clicked the blue submit button.

Secondly, the researcher directly taught and demonstrated the study's independent
variable (VM intervention) and dependent variable (i.e., problem-solving skills) to the observers. The researcher trained the observers about the appropriate problem-solving behavior they were to observe by showing them a sample of problem-solving skills procedure measures responses and teaching them correct and incorrect examples of the dependent variables. Training at this point also constituted watching video clips of a model student accomplishing a task, then discussing with the observer trainees what they should have observed and what they should not have observed (examples and non-examples), and then giving them feedback to avoid observer drift during study implementation.

Third, the observer trainees practiced scoring the baseline and intervention assessment activities and determining interobserver agreements (IOA). This phase of observer training began with the researcher showing the observers a sample of a downloaded Nearpod video assessment report and explaining how the Nearpod App would automatically submit the participant's responses once they submitted their video assessment responses. Next, using sample reports, the researcher involved one of the observer trainees as a volunteer to help them calculate the IOA for each fictitious participant response. After a practice session, the researcher and the volunteer reviewed each of the nine hypothetical participants' sample responses and then determined the IOA. Next, they filled out a form (see Appendix A) with answers that they agreed (+) or disagreed (-) about as accurate before awarding the hypothetical participant the correct performance scores to record in an excel sheet. In case of total disagreement about the correct response, the researcher used the initially agreed-upon responses when determining the measures' reliability through IOA (see Appendix I) to reconcile the acceptable participant response. Conflicts in scoring correct performance of target behaviors during training between observers were reviewed, discussed, and repeated until at least 90% accuracy was achieved after three
consecutive sessions (Komaki, 1998).

Fourth, the trainees learned the step-by-step procedure for conducting the study at the baseline, intervention, maintenance, and generalization phases. The researcher developed an observer trainee protocol (see Appendix K) and checklist (see Appendix L) that included: what they should observe, measure, how and when they would record the observed behavior, and how to ensure that they (observers) did not coach or give any instructions to the participants during baseline, maintenance or generalization, and virtual learning environment etiquette. The checklist included steps such as ensuring that the observers played the correct video at sufficient volume and a check for their understanding of their obligations after watching the video. Finally, in addition to this training, the researcher conducted occasional observer retraining or booster sessions and routinely completed fidelity checks throughout the sessions to minimize observers’ drift, as Cooper et al. (2020) recommended.

Training of Participants. The observer trainees trained the initial five participants individually and in groups in collaboration with the researcher, depending on the participants’ schedules and availability following observer training. The training was in person on an online platform and lasted about 30 minutes per session for five days. The researcher was available to offer support during training. The environment where the training occurred was similar to the study location to minimize or control for reactivity when the study commenced.

The participant training began with direct step-by-step teaching about the access and use of technology in this study (i.e., Nearpod and Zoom). Access included explicit instruction and demonstration of how to power a Chromebook computer, log into the applications using the given credentials and a code Nearpod generated automatically to join a lesson, and play the video using the correct volume. For students who could not join the lessons by logging onto the
applications independently, the observers helped. Next, the observers showed the participants a series of random video assessments not related to problem-solving skills, then trained the participants on how to type their video assessment responses using the keyboard or by speaking into an onscreen microphone which transcribed their speech responses before they clicked the blue submit button to record their answers. The participants demonstrated an ability to respond by typing their responses or speaking into the onscreen microphone and then clicking the blue submit button at least ten times with 100% accuracy before the training stopped. During the process, when the participants chose to use the onscreen microphone, the observers reminded them to click the blue submit button to record their answers using a least-to-most prompts system (Snell & Brown, 2011; Spooner et al., 2012). The least-to-most prompting procedure began with the observer/researcher first allowing the participant to respond independently by clicking the blue submit button before they delivered prompts in case the participants did not respond within 3 seconds, starting with the least intrusive prompt and working through the hierarchy from least to most intrusive until the learner could perform the response correctly and independently (Collins, 2012). In short, if the participant did not know how to submit the answers after typing or speaking into the onscreen microphone, the observer told them what to do using a firm voice. Then, if the participant did not respond within three seconds, the observer showed them by pointing to the blue submit button on the screen. And lastly, if they still did not know what to do, the observer helped them click the blue submit button (Collins, 2012).

The researcher developed a participant training protocol (Appendix M) and checklist (Appendix N). This checklist helped the observers and researcher determine if the participants had attained the requisite training level before the study began.
**Baseline Phase**

The baseline phase followed the pre-intervention phase after the participants acquired skills to access and navigate the virtual learning platform. At this stage, the researcher had developed meaningful problem situations commensurate with the participant's needs, preferences, and present level of performance as gathered from informal teacher interviews and recorded them in a video to assess the desired problem-solving skill behavior. The researcher then established the baselines for each participant through a series of observations to determine their number of correct responses to problem-solving skills procedures per session before the VM intervention. While the researcher was keen to observe a stable response rate at baseline before introducing the intervention (Baer et al., 1968), the number of sessions per participant at baseline was five, eight, 11, and 14 days, respectively. Each baseline session lasted about 20 minutes per day. The researcher, in collaboration with the teacher/job coach, presented the baseline by following the observers' training protocol (see Appendix K) and checklist (see Appendix L) recommendations and the outlined procedure for implementing the study (see Appendix O).

The baseline phase began with a participant logging into the virtual learning platform either independently or with the help of an observer (teacher or job coach). The researcher then informed the participant that they would be watching a video clip with scenarios that depicted different work situations with questions embedded in the video scenario (i.e., problem-solving situation baseline measure; see Appendix E). Next, the researcher reminded the participant to use the skills they had learned during training sessions by typing on the keyboard or speaking their responses into the onscreen microphone and then clicking the blue submit button.
The researcher also reminded the participants that they would not get any feedback or be allowed to ask questions except for technology-related inquiries once the activity began. Additionally, the researcher reminded the participants that they would time the activity (i.e., participants had about 20 minutes once the video clip started to play on their screen). Finally, the researcher asked the participants if they had any questions before the baseline activity began. The script read like this: "You will watch a timed video clip that depicts different work scenarios on your screens. After watching the video clips, you will answer the questions that follow by typing on the keyboard or speaking into the onscreen microphone, then clicking the blue submit button to record your response. You will not get any feedback or be allowed to ask questions except about using the technology once the video starts playing on your device. Do you have any questions before we start?"

The researcher then played an approximately six-minute video clip comprising three different one to two-minute-long work problem scenarios (i.e., either a missing material, a broken material, a mismatched material, a complete material, or incomplete material/partially complete material). The video clip the researcher showed the participants at this stage embedded video assessment probes consisting of 3 questions per scenario as described under the problem-solving situation baseline measure (see Appendix E). Only observation occurred during this stage—there was no feedback, prompting, or reinforcement of the participant's actions. The intention was to establish each participant's number of correct responses to problem-solving skills procedures per baseline session before the researcher introduced a VM intervention. After the session ended, the researcher thanked the participants for participating before downloading the participant report and then met with the assigned observers for about 10 minutes to determine IOA and accurate participant scores.
Each question in the video assessment constituted one point. Therefore, the researcher awarded participants three points if they correctly answered all three questions in a video scenario. If they correctly answered all three questions for each video scenario in a session, they would have demonstrated a maximum correct response rate to problem-solving skill procedures (i.e., nine problem-solving skills per session). The researcher and the assigned observer determined IOA (for 30% of the baseline sessions) and then recorded the correct final score in an Excel sheet for analysis after each baseline session. The researcher also routinely completed the fidelity checks to ensure they implemented the baseline without deviating from the outlined procedures.

**Intervention Phase**

The intervention phase followed the baseline phase. The researcher introduced the intervention to participants staggered, as it is customary practice in multiple-baselines across participant design (Baer et al., 1968). Each intervention session lasted approximately 25 minutes, with 13, 10, seven, and four days of intervention per participant. The intervention phase began with the participants logging into the virtual learning platform either independently or with the help of an observer (teacher or job coach).

The researcher then said to the participant, "You will first watch a video clip that teaches you how to solve different work-related problems. The video clip will also teach you what you should do if you cannot solve the problem independently, and it will last about 6 minutes. After watching the video clip, you will watch another new timed video clip for about 6 minutes that has questions in it that you will answer (for about 12 minutes) by typing on the keyboard or speaking into the onscreen microphone, then clicking the blue submit button to record your response. You will not get any feedback or be allowed to ask questions except about using the
technology once the video starts playing on your device. Do you have any questions before we start?"

After showing the VM demonstration (about 6 minutes), the researcher instructed the participants to use the strategies they observed in the video model to respond to questions in the following session. Next, the researcher gave the participants a problem-solving intervention video assessment (see Appendix F) for about 18 minutes. The researcher intended to establish at this point if the participants would use the same problem-solving skills strategies they observed in the video model demonstration to solve problems contrived from a competitive employment situation.

After the session ended, the researcher thanked the participants for their participation before downloading the participant assessment report from Nearpod, then met with the assigned observer for about 10 minutes to determine IOA for about 50% of the intervention sessions. The researcher then recorded the correct final score in an Excel sheet for analysis. The researcher also routinely completed fidelity checks to ensure they and the observers implemented the intervention without deviating from the outlined procedures.

**Follow-up/ Maintenance**

According to Cooper et al. (2020), maintenance implies the extent to which the participants will continue to perform the target behavior following the withdrawal of intervention. Therefore, the follow-up/maintenance phase followed one week after the end of the intervention phase for each participant. The process was similar to the baseline phase except for a probe administered twice within a week (i.e., two out of five days) for about 20 minutes following a participant's last day of the intervention. The intention was to establish if the students had maintained their problem-solving skill procedure ability (i.e., problem identification, the
problem's potential solution, and what to do when they cannot solve the problem) one week following the end of the intervention.

The maintenance phase began with the participants logging into the virtual learning platform either independently or with the help of an observer (teacher or job coach). The researcher then said to the participant, "you will watch a timed video clip that depicts different work scenarios on your screens. After watching the video clips, you will answer the questions that follow by typing on the keyboard or speaking into the onscreen microphone, then clicking the blue submit button to record your response. You will not get any feedback or be allowed to ask questions except about using the technology once the video starts playing on your device. Do you have any questions before we start?"

Like baseline, participants did not receive teaching, feedback, or reinforcement (only observing and recording performance data took place). In a staggered yet random fashion, the researcher administered by playing via Nearpod, a problem-solving situation maintenance video assessment (see Appendix G). The video assessment lasted about 18 minutes and comprised three different one to two-minute-long work problem scenarios (i.e., either a missing material, a broken material, a mismatched material, a complete material, or incomplete material/partially complete material). The video clips the researcher showed to each one of the participants embedded video assessment probes consisting of 3 questions per scenario, similar to the problem-solving situation baseline measure.

After the session ended, the researcher thanked the participants for their participation before downloading the participant assessment report, then met with the assigned observer for about 10 minutes to determine IOA for 100% of the maintenance probe sessions. The researcher then recorded the correct final correct score in an Excel sheet for analysis. The researcher
routinely completed the fidelity checks to ensure they and the observers implemented the maintenance phase without deviating from the outlined implementation procedures (see Appendix O).

**Generalization**

Generalized behavior change is one of the seven defining characteristics of Applied Behavior Analysis (Baer et al., 1968). Therefore, participants' generalization of the learned problem-solving skills across time, settings, and behaviors was crucial in this study. In collaboration with the teachers and job coaches, the researcher contrived competitive work situations within the participant’s daily job site/work experience locations (i.e., a university campus, a law firm, an apartment, and a hotel). They conducted a generalization probe for each participant for about 15 minutes the week following the maintenance probe. There was only one generalization probe because of time constraints. During this phase, there was no VM intervention, video assessment, or use of virtual learning platforms. There was also no instruction or feedback - just observation of task performance and recording the response to probe questions.

The process began with the observers (job coaches) accompanying the participants to their on-campus job locations. The observer then informed the participants about what job tasks they needed to accomplish by saying, "You will be required to accomplish a job task with different components (some of the job task components may be missing, mismatched, broken, complete, or incomplete/partially complete). I will verbally ask you three questions once you encounter a specific work scenario. You will respond by answering the questions verbally for me to record your response. You will not get any feedback or be allowed to ask questions once you start working. Do you have any questions before we start?"

The participants experienced real work problem scenarios that cut across three out of five
distinct categories (i.e., missing papers, a broken chair, mismatched utensils, complete filing tasks, incomplete/partially complete cleaning tasks, and missing dustpan). The job coach and the researcher then observed the participants as they solved the work-related problems by following the same problem-solving skills procedures learned during this study's VM intervention phase – the SDLM of problem-solving (Wehmeyer, Plamer, et al., 2000). A SDLM for problem-solving skills procedures involves setting a goal (What do I need to solve?), developing an action plan (What will I do to succeed?) then evaluating the progress (is it working?). They observed whether the participants could identify the given problem, how they could solve it, and what participants would do if they could not solve it independently.

For each problem category encountered by the participant, the job coach verbally asked the three requisite questions similar to the video assessment probes (i.e., what is the problem? How can you solve it? and what will you do if you cannot solve it?). Next, the job coach discreetly recorded the participant's response (to control reactivity) using the same nine-point grading system per session as used in the previous phases of this study. The job coach then recorded the responses in a form developed by the researcher (see Appendix H). After the session ended, the job coach thanked the participants. The researcher then met with the job coach for about 10 minutes to discuss what they observed and their findings before the researcher recorded the final score in an Excel sheet for analysis.

**Social Validity**

Following the generalization probes, the researcher administered a post-treatment questionnaire similar to the one at the start of the study (see Appendix D) and then provided the social validity questionnaires to the participants and observers (see Appendix J) to evaluate possible knowledge changes and their perception of the intervention. The researcher gave the
social validity questions to the participants and observers by sharing a Qualtrics software QR code they scanned or a link they clicked to open the questions on a computer or phone. The observers and participants completed the questions independently without any help. The researcher then thanked them for participating in the study. This stage marked the end of this part of the study before data analysis and interpretation commenced.

**Data Analysis**

The researcher used both visual analysis and statistical analysis in this study. First, the researcher determined IOAs for different study phases (baseline, intervention, and maintenance) and then recorded the numerical data for each session in an Excel sheet. After that, the researcher used the dependent variable data in the excel sheet to plot a line graph to analyze visually. The line graph depicted the dependent variable (change in problem-solving ability over time) and independent variable (sessions during which the researcher applied VM or not) and its phase change lines. Also, the researcher used the numerical data they recorded in the Excel sheet to perform statistical analysis as described below.

**Visual Analysis**

Subsequently, the researcher visually analyzed the graph by following Kratochwill et al. (2021) proposed recommended addition to the updated What Works Clearinghouse (WWC) *Standards for Single-Case Research Design (Standards 4.1)* that meets design standards and provides strong evidence. The visual analysis involved interpreting six features: level, trend, variability, the immediacy of effect, overlap, and consistency of data patterns across multiple presentations of VM interventions and nonintervention conditions (Horner et al., 2005). In keeping with Horner et al. (2005), the researcher established the level in this study by calculating the mean performance of the outcome (i.e., problem-solving ability/dependent
variable) within a phase. The trend equated to the rate of increase or decrease (i.e., slope) of the best fitting line for the outcome measure within a phase. The researcher examined the direction of the data path and established whether the trend was flat, increasing, decreasing, variable (unstable), or stable (Richards, 2018). On the other hand, variability equated to how each participant's performance fluctuated around a mean or slope during each phase.

The researcher determined the immediacy of effect by observing the change in level between the last three data points in one phase and the first three data points of the next phase (Kratochwill et al., 2010). In line with Kratochwill et al. (2010), the researcher determined overlap by observing the proportion of data in the intervention phase that overlapped with data from the baseline phase for each participant. The smaller the proportion of overlapping data points, the more compelling there would be a demonstration of an experimental effect (Kratochwill et al., 2010). The researcher used the Scruggs et al. (1987) percentage of non-overlapping data (PND) method to determine the overlap in this study. The researcher calculated PND by assessing the number of data points in the intervention phase greater than the highest level in the baseline phase, dividing it by the total number of data points in the intervention phase, and multiplying by 100 percent (Richards, 2018). According to Scruggs and Mastropieri (1998), when PND is at least 90%, the intervention is considered very effective, while at least 70% is judged relatively effective intervention. On the other hand, scores between 50% and 70% indicate questionable intervention effectiveness, while a score below 50% represents an ineffective intervention.

Finally, the researcher analyzed the consistency of data patterns across multiple presentations of VM interventions and nonintervention conditions (i.e., consistency across similar experimental conditions) by looking at data from all phases within the same condition.
(e.g., all baseline or all intervention phases) and then examining the extent to which there was consistency in the data patterns from the same conditions (Kratochwill et al., 2021), also, by analyzing the consistency of intervention effect on each participant. In line with Kratochwill et al. (2021) proposals, the researcher assessed the outlined six components of visual analysis individually and collectively to determine whether the study demonstrated a causal relation and whether there was an indication of experimental effect at four points in time.

**Statistical Analysis**

Additionally, the researcher employed statistical analysis using descriptive measures (e.g., mean, median, range, and rate) to describe aspects of the collected data without inferences to their statistical significance (Richards, 2018), as is common practice in single-subject research designs. The researcher used descriptive rather than inferential statistics because while parametric statistics assumes independence of each observation (Barlow et al., 2009), the same researcher collected data during each observation in this study, thereby introducing the likelihood of autocorrelation in the data (Busk & Marascuilo, 1992). Autocorrelation is a correlation between data points separated by time intervals or lags (Kazdin, 1984). Autocorrelation can increase the likelihood of Type I error (i.e., a false rejection of the null hypothesis). Furthermore, a single-subject study needs prediction, verification, and replication to demonstrate a functional relationship between independent and dependent variables. This requirement to prove a functional relationship makes the observations serially dependent, rendering inferential statistics unsuitable because of the lack of independent observations (Kazdin, 1984).

**Effect Size.** Consistent with Olive and Smith's (2005) recommendation, the researcher in this study determined the effect size by reporting the data in tandem with individual participant
graphs because a determination of effect size when used alone may mask important characteristics of the single-subject data. While it was initially the researcher’s intention to use PND exclusively to determine the effect size in this study (since PND is a non-regression effect size calculation method suitable for single-subject studies because of fewer baselines which render data obtained non-linear; Marquis et al., 2000), they changed their mind about exclusive PND use. The change was because there were sessions in which a participant’s performance produced zero data at baseline. According to Olive and Smith (2005), PND presents a limitation because it may be problematic to calculate when zero data are in the baseline, as was the case with one participant (Sarah) in this study (See Chapter 4).

The researcher, therefore, used between-cases standardized mean difference (SMD; Hedges et al., 2012; Hedges et al., 2013; Pustejovsky et al., 2014; Shadish et al., 2014), a point estimate of the treatment effect to determine the overall effect size in this study to augment the use of PND. Between cases, SMD is comparable with Cohen’s $d$ standardized mean difference (Cohen 1988), often used in between-subjects designs, and it estimates the same effect size parameter as in a between-case experimental design using data from a single-case design.

To calculate the effect size between participants in this study, the researcher used the SMD estimator https://jepusto.shinyapps.io/scdhlm/. The SMD estimator helped the researcher to establish the magnitude and direction of the VM intervention effect (i.e., functional relationship) on a scale that researchers can use to compare across studies. According to Faraone (2008), an SMD of zero would mean that the VM and non-intervention conditions have equivalent effects. Additionally, if improvement in problem-solving skills is associated with higher scores on the outcome measure (i.e., dependent variable), as was assumed in this study, SMD greater than zero would indicate the degree to which VM intervention was more efficacious than non-intervention
condition. Conversely, SMD less than zero would indicate the degree to which intervention was less efficacious than the non-intervention condition.

In summary, Cohen (1988) offered the following guidelines for interpreting effect size (i.e., the magnitude of SMD) in the social sciences, which the researcher abided by, i.e., small, $d = 0.2$; medium, $d = 0.5$; and large, $d = 0.8$. In addition, the researcher factored in the confidence interval (CI) during the calculation of SMD because, according to Faraone (2008), calculating 95% confidence intervals (CIs) for SMD can facilitate a comparison of the effects of different treatments (Faraone, 2008).

Using SMD to determine the overall effect size of the intervention in this study has some benefits. The first benefit is that the established effect sizes can be weighted and synthesized in a meta-analysis that includes other single-case or between-group designs. The second benefit is that it translates single-case results into terms that are familiar to between-case researchers (Shadish et al., 2015).

**Qualitative Analysis**

The researcher used qualitative methods to supplement the data collected in this study. Qualitative data analysis helped the researcher establish the social significance of this study to participants as per the principles of ABA (Baer et al., 1968). Specifically, the researcher analyzed field notes and responses to the questionnaires given to participants and their teachers at the beginning and end of the study.
Chapter IV
Results

Overview

This chapter presents the results of the current study, whose purpose was to determine the effectiveness of using video modeling (VM) to teach problem-solving skills for employment to four transition-aged students with a diagnosis of autism spectrum disorders (ASD) and intellectual and developmental disorders (IDD) through a virtual learning platform.

During the study at baseline, the participants watched a series of approximately six-minute video assessments (VA) per session through a virtual learning platform (Nearpod). Each VA included three out of five problem situations (i.e., a broken vacuum, missing staples, mismatched salt, and paper shaker containers, complete bathroom supplies tasks, and incomplete letter sorting tasks) per session. The VA questions included (a) what do you notice? (b) What should happen? and, (c) what if it does not happen? During this baseline phase, the researcher collected data about each participant's number of correct responses to problem-solving skills procedures per session before the introduction of VM intervention.

The intervention phase of the study consisted of the participants first watching a VM that utilized a SDLM of instruction (Wehmeyer, Palmer, et al., 2000) to teach problem-solving skills through a virtual learning platform (Nearpod). The SDLM of instruction involves setting a goal (what is the problem?), developing an action plan (How can I fix the problem?), and then evaluating progress (what should I do if I cannot fix the problem?). The VMs watched in each session included three out of five problem situations (i.e., missing, broken, mismatched, complete, incomplete/partially complete, and missing materials). Please refer to table 5 in Chapter three for explicit content and sequence of the five VMs used. Next, the participants watched a problem-solving intervention VA. The intervention VA questions included (a) what is
the problem? (b) how can you fix the problem? and (c) what should you do if you cannot fix the problem? During this stage, the researcher collected data about each participant's number of correct responses to problem-solving skills procedures per session following the introduction of VM intervention through a virtual learning platform.

The maintenance phase followed the study's intervention phase and was similar to the baseline phase, as there was no VM demonstration. The VA questions, however, were identical to the intervention phase (i.e., (a) what is the problem? (b) how can you fix the problem? and (c) what should you do if you cannot fix the problem?). At this phase, the researcher collected data about each participant's number of correct responses to problem-solving skills procedures per session through a virtual learning platform (Nearpod) following the withdrawal of a VM intervention. During the generalization phase, which took place in an actual work experience location, the job coaches contrived a work situation with three out of five problem situations (i.e., missing papers/dustpan, broken chair, mismatched utensils, complete filing tasks, and incomplete/partially complete cleaning tasks). The job coaches verbally asked each participant the three questions aligned with the SDLM of instruction (i.e., (a) what is the problem? (b) how can you fix the problem? and (c) what should you do if you cannot fix the problem?) whenever they encountered the contrived problem. During this phase, the researcher collected data about each participant's number of correct responses to problem-solving skill procedures per session and the application of problem-solving skills procedures to an actual work problem situation. Please refer to chapter three for a detailed description of the procedures and types of assessments used in this study.

The researcher presents the results by summarizing each participant's performance across the phases (baseline, intervention, maintenance, and generalization) using visual (i.e., level,
trend, variability, the immediacy of effect, overlap, and consistency of data patterns) and statistical (i.e., mean, median, and range) analysis. Also reported are results of the intervention effect (Percentage of non-overlapping data; PND), overall study effect (standardized mean difference; SMD), and results from pre-and post-intervention questionnaires and social validity outcomes.

**Participant Performance**

The results of the four participants (Queen, Sarah, Homer, and Sheeza) are reported below. They were 20-year-old students with ASD and/or IDD in a post-secondary education transition program. The participants watched VM demonstrations of problem-solving skills (at the intervention phase) and responded to VA questions (at baseline, intervention, and maintenance phases) using a virtual learning platform (i.e., Nearpod app). They also responded to verbal assessment questions following observations at generalization. Data collected from the assessments were the participant's number of correct responses to problem-solving skills procedures per session. Problem-solving skill procedures constituted the participant accurately identifying a work-related problem presented, finding a possible solution, and explaining what they would do if they could not solve the problem independently. Figure 5 below depicts the four participants' (Queen, Sarah, Homer, and Sheeza's) number of correct responses to problem-solving skill procedures across this study's four phases (Baseline, Intervention, Maintenance, and Generalization), followed by a detailed description of each participant's performance using visual and statistical analysis.
Figure 5

Participants' number of correct responses to problem-solving skills procedures across conditions
Queen's Performance

Baseline

During baseline, Queen's level of performance was low at 2 correct responses (range 1–2). The baseline trend of problem-solving skill performance was increasing but stable in the four sessions following the first session. The median score at baseline was 2.

Intervention

Upon the introduction of the VM intervention, there was a change in Queen's level of problem-solving skills performance from 2 (range 2–2) correct responses during the last three sessions of baseline to a level of 5 (range 3–7) correct responses during the first three sessions of VM intervention. This change signifies that the VM intervention met the criteria of the immediacy of effect on Queen's problem-solving skills performance. Queen's overall level of problem-solving skill performance at intervention was at 4 (range 2–7), which was higher than the baseline level of performance by 2 correct responses. The median score was 4. The trend at intervention was slightly decreasing. However, high variability was observed for Queen's problem-solving skill performance, making it difficult to predict and verify the trend direction. The percentage of non-overlapping data (PND) was 77%, depicting a relatively effective VM intervention effect. A functional relation was evident for Queen.

Maintenance

Results indicated that one week after the researcher withdrew the VM intervention, Queen maintained problem-solving skills at a level of 3 correct responses, which was lower than the level in the intervention phase (4). However, the level of performance during the maintenance phase was still higher than the level at baseline, signifying maintenance.
**Generalization**

The generalization probe for Queen took place at an off-campus job site two weeks following the withdrawal of intervention and was conducted by the teacher/job coach, who usually accompanied the participants to job sites. Queen's generalization performance level was slightly above average at 5, implying that she generalized her problem-solving skills in an untrained setting at a level higher than the baseline (2), intervention (4), and maintenance (3) phases.

**Sarah's Performance**

**Baseline**

During baseline, Sarah's level of performance was very low at 1 (range 0–1) correct response. The baseline trend of problem-solving skill performance was decreasing but highly unstable across the eight sessions. The median score at baseline was 1 Correct response.

**Intervention**

Upon the introduction of the VM intervention, there was a change in Sarah's level of problem-solving skills performance from 1 (range 0–1) correct response during the last three sessions of baseline to a level of 3 (range 2–3) correct responses during the first three sessions of VM intervention. This change signifies that the VM intervention met the criteria of the immediacy of effect on Sarah's problem-solving skills performance. Sarah's overall level of problem-solving skill performance at intervention was at 3 (range 2–4) correct responses, which was higher than the baseline performance level by 2 correct responses. The median score was 3 correct responses. Unlike at baseline, the trend at intervention was increasing but highly unstable like in baseline, making it difficult to predict the trend direction. The PND was 100%, depicting a very effective VM intervention effect. A functional relation was evident for Sarah.
**Maintenance**

Results indicated that one week after the researcher withdrew the VM intervention, Sarah maintained a level of problem-solving skills (3) comparable to the level at the intervention phase (3). However, Sarah's performance level during maintenance was still higher than the baseline (1), signifying maintenance.

**Generalization**

The generalization probe for Sarah took place at an off-campus job site two weeks following the withdrawal of intervention and was conducted by the teacher/job coach, who usually accompanied the participants to job sites. Sarah's performance at generalization was high at 5 correct responses, implying that she generalized her problem-solving skills in an untrained setting at a higher rate than her baseline (1), intervention (3), and maintenance (3) performance levels.

**Homer's Performance**

**Baseline**

During baseline, Homer's level of performance was low at 2 (range 1–3) correct responses. The baseline trend of problem-solving skill performance was increasing but low and unstable across the eleven sessions. The median score at baseline was 2 correct responses.

**Intervention**

Following the introduction of the VM intervention, there was a change in Homer's level of problem-solving skills performance from 2 (range 2–2) correct responses during the last three sessions of baseline to a level of 7 (range 6–8) correct responses during the first three sessions of VM intervention. This change signifies that the VM intervention met the criteria of the immediacy of effect on Homer's problem-solving skills performance. Homer's overall level of
problem-solving skill performance at intervention was high at 7 (range 6–8) correct responses, which was higher than the baseline performance level by 5 correct responses. The median score was 7 correct responses. The trend at intervention was slightly increasing and unstable like in baseline, making it difficult to predict the trend direction despite Homer's high-performance level observed visually. The PND was 100%, depicting a very effective VM intervention effect. A functional relation was evident for Homer.

**Maintenance**

Results indicated that one week after the researcher withdrew the VM intervention, Homer maintained problem-solving skills at a higher level (8) than at the intervention (7) and baseline (2) phases. The higher level of performance signifies maintenance.

**Generalization**

The generalization probe for Homer took place at an off-campus job site two weeks following the withdrawal of intervention and was conducted by the teacher/job coach, who usually accompanied the participants to job sites. Homer's generalization performance level was very high at 8, implying that he generalized problem-solving skills in an untrained setting at a level higher than the baseline (2) and intervention (7) phases and at a level similar to the maintenance (8) phase.

**Sheeza's Performance**

**Baseline**

During baseline, Sheeza's level of performance was low at 2 (range 1–4) correct responses. The baseline trend of problem-solving skill performance was decreasing but unstable across the 14 sessions. The median score at baseline was 2 correct responses.
**Intervention**

Following the introduction of the VM intervention, there was a change in Sheeza's level of problem-solving skills performance from 2 (range 1–3) correct responses during the last three sessions of baseline to a level of 5 (range 5–6) correct responses during the first three sessions of VM intervention. This change signifies that the VM intervention met the criteria of the immediacy of effect on Sheeza's problem-solving skills performance. Sheeza's overall problem-solving skill performance level at intervention was slightly high at 5 (range 5–6) correct responses, which was higher than the baseline performance level by 3 correct responses. The median score was 5 correct responses at intervention. The trend at intervention was decreasing and unstable, resembling the baseline trend, despite Sheeza's high-performance level. The PND was 100%, depicting a very effective VM intervention effect. A functional relation was evident for Sheeza.

**Maintenance**

Results indicated that one week after the researcher withdrew the VM intervention, Sheeza maintained problem-solving skills at a higher level (6) than the level at the intervention phase (5). In addition, the level of performance during the maintenance phase was also higher than the level at baseline (2), signifying maintenance.

**Generalization**

The generalization probe for Sheeza took place at an off-campus job site two weeks following the withdrawal of intervention and was conducted by the teacher/job coach, who usually accompanied the participants to job sites. Sheeza's generalization performance was very high at a level of 8 correct responses, implying that she generalized her problem-solving skills in
an untrained setting at a level higher than the baseline (2), intervention (5), and maintenance (6) phases.

**Consistency of Data Patterns**

Visual analysis in single-subject research designs constitutes an analysis of the consistency of data patterns across multiple presentations of interventions and nonintervention conditions (Horner et al., 2005; Kratochwill et al., 2021). Therefore, this section presents the results of this study relating to the consistency of data patterns across similar experimental conditions (i.e., baseline and intervention) and the consistency of intervention effects.

**Consistency Across Similar Experimental Conditions**

The researcher's visual analysis of the consistency of data patterns indicates that there were slightly similar patterns of responding before (i.e., baseline phases) and after (i.e., intervention phases) they introduced the VM intervention. At baseline, the consistency of data patterns was medium across the four participants. Queen and Homer exhibited similar increasing trends yet low-performance levels, unlike Sarah and Sheeza, who demonstrated decreasing trends yet low and unstable performance levels. Despite the slight differences in consistency between participants, all the participants' performance level was low at baseline, indicating consistency of data patterns.

There were slight differences that the researcher observed in the consistency of data patterns at intervention despite the high-performance levels demonstrated by them in comparison to the baseline. For instance, only Sarah and Homer demonstrated an increasing trend in their performance, unlike Queen and Sheeza, who exhibited a decreasing trend in performance at intervention. However, despite the slight differences observed in the consistency of data patterns
at intervention, all four participant's performance levels were higher than at baseline, signaling a consistency of data patterns.

**Consistency of the Intervention Effects**

Upon the researcher's introduction of the VM intervention, there was a high consistency of effects of VM intervention as observed across all four participants. The immediate change in performance levels across each participant verified the high consistency of effects. Additionally, the maintenance of high overall performance levels that differed from the lower baseline performances observed across the four participants corroborated the high consistency of VM intervention effects.

**Effect Size**

The overall effect size for this study \(d = 2.0\) exceeded Cohen's (1998) convention for large effect \(d = 0.8\), signifying a high intervention effect (See Table 8 below). VM intervention was associated with a significant increase in problem-solving skills when used in a virtual learning environment compared to the non-VM intervention condition in a virtual learning environment at baseline \((d = 2.0; \ SE = 0.44; 95\% \ CI [1.04 – 2.89])\). This evidence corroborates findings relating to overlap (PND) as outlined in the individual participant's results outcome, whereby the researcher established the VM intervention to be effective for all four participants. The entire 95% CI lies above 0, meaning there was a statistically significant increase in problem-solving skills across the four participants when the researcher introduced VM intervention in a virtual learning platform.
Table 8

Summary of Effect Size

<table>
<thead>
<tr>
<th>BC-SMD estimate</th>
<th>Std. Error</th>
<th>95% CI (lower)</th>
<th>95% CI (upper)</th>
<th>Degrees of freedom</th>
<th>Auto-correlation</th>
<th>Intra-class correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.00</td>
<td>0.44</td>
<td>1.04</td>
<td>2.89</td>
<td>16.98</td>
<td>0.14</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Pre- and Post-Intervention Questionnaires

The pre-and post-intervention questionnaires revealed some varied but qualitative improvements in participant knowledge about what problems are, the types of problems they may encounter in work situations, and how they can solve them when they arise. For instance, Queen's and Sheeza's problem definition pre-intervention improved post-intervention. See table 9 below for a summary of participant responses to pre- and post-intervention problem-solving questionnaires. Additionally, the participant's identification of different types of problems they may encounter at work improved, whereby Homer, for example, identified a category of a problem that may arise at work (i.e., broken material) following the intervention. Also, at the beginning of the study, three participants (Homer, Sarah, and Queen) responded to the question about how they can fix a problem (how can you fix a problem?) by saying that they would ask for help before trying to fix/solve the problem on their own. Finally, following the intervention, the participant's responses to the post-intervention questionnaire revealed that they understood the need to try solving the problem before they asked for help from the supervisor or the job coaches. See table 9 below for a summary of the pre-and post-intervention questionnaires.
Table 9

*Pre- and Post-Intervention Questionnaires Participant Responses*

<table>
<thead>
<tr>
<th>Name</th>
<th>What is a problem?</th>
<th>Can you name a problem at work?</th>
<th>How can you fix a problem?</th>
<th>Did it work?</th>
<th>Did you ask for help?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homer (Pre)</td>
<td>A problem is a situation that can interrupt your life that you will need to problem solve to find a good way to handle what the situation is.</td>
<td>Misunderstanding the Direction</td>
<td>Asking the supervisor for help.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Homer (Post)</td>
<td>A Problem is something that randomly comes up in everyday life.</td>
<td>Something Breaks.</td>
<td>You can try to fix it yourself or if you can't fix it on your own you can ask for some help to fix the problem.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sarah (Pre)</td>
<td>A matter or situation regarded as unwelcome or harmful and needing to be dealt with and overcome.</td>
<td>I had a customer at work, and she used reusable bags and she threw her groceries on the counter then left and pushed the cart to the side.</td>
<td>You can fix a problem by working it out with the other person.</td>
<td>not really because the customer was yelling and screaming at me</td>
<td>Yes, I did!</td>
</tr>
<tr>
<td>Sarah (Post)</td>
<td>A problem is a situation that you are having trouble with.</td>
<td>A problem I had work is that I had a customer, and she used her reusable bags and she had a fit because I didn't put them in her bags so she emptied the groceries on the counter and took the cart and pushes it away.</td>
<td>You can fix the problem by maybe telling her don't do it again it was probably just a mistake, or she was just having a bad day or something.</td>
<td>Sort of, not really</td>
<td>I called someone over and they handled the situation right away I didn't wait I did it immediately.</td>
</tr>
</tbody>
</table>
Table 9 Continued

<table>
<thead>
<tr>
<th>Name</th>
<th>What is a problem?</th>
<th>Can you name a problem at work?</th>
<th>How can you fix a problem?</th>
<th>Did it work?</th>
<th>Did you ask for help?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queen</td>
<td>A problem is to deal with situations.</td>
<td>A problem to work is hard to focused.</td>
<td>Tell a teacher and an adult to fix a problem.</td>
<td>Yes, it worked</td>
<td>I would sometimes ask for help.</td>
</tr>
<tr>
<td>(Pre)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Queen</td>
<td>The problem can be like a task, or it can be a problem solving.</td>
<td>The problem at work I can be a little bit problem solving.</td>
<td>I can ask for a supervisor and tell them if I want to move on a task.</td>
<td>Yes, and I always rethink everything.</td>
<td>Sometimes or I would work independently for myself</td>
</tr>
<tr>
<td>(Post)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheezah</td>
<td>Sometime if I do work sometime, I need help because I get confused sometimes.</td>
<td>Lottery tickets, sometimes if I get confused in cash register.</td>
<td>If I keep on trying and trying, I will get it.</td>
<td>Little bit</td>
<td>Little bit</td>
</tr>
<tr>
<td>(Pre)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheezah</td>
<td>The problem is I was trying to work on filling out my paper and I was confused on the questions</td>
<td>I was trying to work on my paper and I was confused little bit</td>
<td>I can ask for help and my boss can explain how to do it</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>(Post)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Social Validity

Participants

All four participants \((N = 4)\) responded positively to the social validity questionnaire at the end of the study. Specifically, three (Queen, Sheeza, and Homer) of four participants acknowledged enjoying learning about problem-solving online on a computer \((M = 0.75)\), with Sarah unsure if she agreed or disagreed. On the other hand, all the participants agreed that they learned about a problem \((M = 1)\) and how to solve it \((M = 1)\) after watching VMs. In addition, Sarah did not answer whether or not they enjoyed watching the models in the videos solve work problems. Queen, Sheeza, and Homer said they enjoyed watching the VMs solve work problems \((M = 1)\). Queen, Sheeza, and Homer said they would like to watch VMs in the future to learn something new, with Sarah being neutral about it \((M = 0.75)\). Finally, all the participants agreed that they thought other individuals with disabilities could learn by watching VMs \((M = 1)\).

Observers

The participant's two teachers/job coaches \((N = 2)\) who acted as observers also responded positively and similarly to all the questions in the social validity questionnaire at the end of the study \((M = 1)\). The two observers not only believed that teaching problem-solving skills are essential to their student's success \((M = 1)\) and that strategies implemented were reasonably easy to implement \((M = 1)\) but also said they were likely to use the same strategies in their class in the future \((M = 1)\) as the intervention was feasible in the amount of time required to teach \((M = 1)\). Additionally, the teachers recognized that VM was practical in a virtual learning environment as the videos were appropriate for the participant's ability \((M = 1)\), and the intervention was feasible in the amount of time required to teach problem-solving \((M = 1)\). Finally, in their response, the teachers said they felt comfortable teaching problem-solving skills using VM in a virtual
learning environment ($M = 1$) and would continue to use the strategies implemented to teach their students in the post-secondary transition program post-study ($M = 1$).
Chapter V
Discussion

Overview

This chapter summarizes and discusses the findings of the study. The purpose of the study was to determine the effectiveness of using video modeling (VM) to teach problem-solving as a soft skill for employment to four transition-aged students with a diagnosis of autism spectrum disorders (ASD) and/or intellectual and developmental disorders (IDD) through a virtual learning platform. The chapter interprets the study findings by examining the relationships between VM intervention that applies a self-determined learning model (SDLM) of problem-solving instruction and problem-solving skill performance. Also discussed are the implications and recommendations of the current research study findings to practice, research, and policy and how the findings might contribute to the existing post-secondary transition programs' evidence-based intervention literature to help support the soft skill needs of students with ASD and/or IDD post-COVID-19 pandemic. Finally, this chapter concludes with the researcher acknowledging some of the limitations of this study relating to the variability in participant performances, design, external validity, and measurement issues.

Discussion of Findings

This study aimed to determine the effectiveness of using VM to teach problem-solving skills procedures as a soft skill for employment to transition-aged individuals diagnosed with ASD and IDD through a virtual learning platform. The researcher sought to answer the following research questions introduced in chapters one and three (a) Can practitioners effectively use a VM intervention in a virtual learning platform to teach problem-solving skills procedures as a soft skill for competitive employment to transition-aged individuals diagnosed with ASD and
IDD? (b) Can students with ASD and IDD use the learned problem-solving skills procedures to solve novel problems after the researcher withdraws VM intervention in a virtual learning environment? (c) Can students with ASD and IDD generalize the use of problem-solving skills procedures in novel settings? (d) Can the use of VM interventions to teach problem-solving skills procedures in a virtual learning environment have desirable effects on student and teacher perceptions?

As per the first research question, the results show that practitioners can effectively use a VM intervention through a virtual learning platform to teach problem-solving skills procedures as a soft skill for competitive employment to transition-aged individuals diagnosed with ASD and IDD. The use of VM intervention in a virtual learning platform (Nearpod) indicated an experimental effect across the participants in this study at four points in time, as observed in the high percentage of nonoverlapping data (PND) values for individual participants and a report of large overall effect size ($d = 2.0$) discussed in detail in chapter four. Additionally, the introduction of the VM intervention led to an immediate increase in the rate of problem-solving among the four participants, thereby confirming that VM can be successfully used in a virtual learning platform to teach problem-solving skills procedures as a soft skill for competitive employment to transition-aged individuals diagnosed with ASD and IDD.

For the second research question, the results show that students with ASD and IDD can continue to use the learned problem-solving skills procedures to solve novel problems after the withdrawal of VM intervention in a virtual learning environment. All the participants except Queen demonstrated maintenance of the learned problem-solving skills at a level above the intervention performance levels. While Queen's problem-solving skills performance rate during the maintenance phase was lower than her performance rate at intervention, it was still higher
than her performance at baseline, denoting maintenance of the problem-solving skills learned using VM in the virtual learning environment to new problem situations she had not encountered before.

For the third research question, the results show that students with ASD and IDD can generalize learned problem-solving skills procedures to novel settings. All four participants generalized the problem-solving skill procedure in an actual work problem situation (i.e., missing papers, a broken chair, mismatched utensils, complete filing tasks, incomplete/partially complete cleaning tasks, and a missing dustpan) up to two weeks following the withdrawal of the VM intervention. The slight differences in maintenance and generalization outcomes may be associated with a combination of extraneous variables and individual differences in executive function, even though the researcher did not collect data to make strong inferences. The differences in executive function may relate to cognitive flexibility (i.e., the ability to switch between thinking about different concepts), working memory (i.e., the ability to store and manipulate information), and higher-order planning ability (i.e., monitoring and evaluating sequential actions towards a goal) as discussed in prior research (see Jones et al., 2018; Miyake & Friedman, 2012).

The fourth research question shows that using VM interventions that apply SDLM to teach problem-solving skills procedures in a virtual learning environment can have desirable effects on student and teacher perceptions. All four student participants responded positively to the social validity questionnaire. Queen, Sheeza, and Homer reported they enjoyed learning about problem-solving skills using VM in a virtual learning environment, with Sarah reporting neutral. All four participants reported that others with disabilities like them could learn problem-solving skills from watching VMs. The intervention had desirable effects on the two teachers/job
coaches who acted as observers in this study. The teachers/job coaches said they could use the VM for problem-solving intervention in a virtual learning environment and use the strategies observed in their classrooms post-study. Involving teachers/job coaches as natural intervention agents also reinforced the social validity of this study. Their presence, participation, and support may not only have worked to control for reactivity amongst the participants, but the teachers/job coaches may also have benefited from learning the strategies they said they would implement in the future with other students who did not participate in this study (Cooper et al., 2020).

In general, the results of this study demonstrate that transition practitioners can successfully use VM to teach problem-solving skills as a soft skill for employment to students with a diagnosis of ASD and/or IDD in a virtual learning platform. In addition, continued use of VM through a virtual learning platform might help practitioners to meet Indicator 13 under IDEA (2004). Indicator 13 requires states to report the percent of youth annually with IEPs aged 16 and over with an IEP that includes appropriate measurable post-secondary goals that are annually updated based upon age-appropriate transition assessment [20 U.S.C. 1416(a)(3)(B)]. The use of VM to teach important skills outlined in a student's IEP goals can help meet objectives towards the annual goals, which may then be reported by schools and states as required by Indicator 13.

**Meaning of Study Results**

These results also mean that using VM that utilizes Wehmeyer, Palmer, et al.'s (2000) SDLM of problem-solving instruction in an online platform provided students with varying systematic skills that enabled them to solve various work problems and become self-determined in their jobs. However, to date, no studies have investigated the impact of VM intervention that
utilizes a SDLM of instruction to explicitly teach problem-solving as a soft skill for employment through a virtual learning platform like in this study.

VM may have effectively taught problem-solving skills online because it allowed repeated viewing of an exemplar model (Bandura & Walters, 1977). Equally important, there was clear evidence of a functional relationship between the VM intervention (independent variable) and the participant's problem-solving skill performance rate (dependent variable). The levels of problem-solving skills performance across the four participants increased immediately after the researcher introduced the VM intervention signifying an experimental effect. Moreover, the consistency of data patterns across the four participants at baseline and intervention phases attests to a functional relationship between the VM (independent variable) and problem-solving skills performance (dependent variable).

**Connection to Previous Research**

The finding of a significant treatment effect of VM intervention offered in a virtual learning platform on problem-solving skills performance outcomes of four transition-aged students with a diagnosis of ASD and/or IDD in the current study parallel findings of past studies that applied VM to teach work-related problem-solving skills to transition-aged adolescents and adults with ASD and/or IDD (Morgan & Salzberg, 1992; Rausa et al., 2016; Yakubova & Zeleke, 2016).

**Contrast with Previous Research**

However, some differences exist between some of the identified past studies (Morgan & Salzberg, 1992; Rausa et al., 2016) and the current study. For instance, Morgan and Salzberg (1992) and Rausa et al. (2016) did not teach problem-solving skills loosely by systematically or explicitly teaching and measuring problem-solving skills among participants like in the current
study. Teaching loosely entails using a variety of noncritical stimuli in the VM demonstration to increase the chances that the generalization setting location will include some of the stimuli observed during the VM instruction (Baer, 1999; Cooper et al., 2020). The absence of loose, systematic/explicit teaching and measuring of problem-solving skills (e.g., Morgan & Salzberg, 1992; Rausa et al., 2016) might create difficulty in the generalization of learned skills by participants. For instance, Morgan and Salzberg (1992) taught the participants how to request a supervisor's assistance while encountering work problems and how to fix and report four work problems. While these skills equate to problem-solving skills, they were not systematically, explicitly, or loosely taught for the participants to understand how to apply them in different situations. Consequently, participants experienced difficulty in generalizing their skills to a new environment.

Similarly, using a VM intervention, Rausa et al. (2016) targeted a specific problem-solving skill (i.e., job-related telephone skill behaviors, including listening and responding to both orders and complaints and professional speech). While the study by Rausa et al. (2016) produced a large effect size, generalization of the skills to other novel problem situations that did not involve telephone use may have been a problem had the study factored in a generalization phase in the study because the skills taught were specific to the phone behaviors.

The current study improved on the two identified past studies (Morgan & Salzberg, 1992; Rausa et al., 2016) by incorporating aspects of loose teaching in the VM demonstrations. Loose teaching in the current study was evident in the use of five different peer models in the videos, presenting a variety of work problem situations (i.e., missing, broken, complete, incomplete, and mismatched), recording the VMs in different work locations, and using three-step SDLM of
instruction. In addition, the SDLM in the VMs applied self-talk to teach problem-solving procedures systematically and explicitly.

**Similarity with Previous Research**

In contrast to the two previously referenced studies by Morgan and Salzberg (1992) and Rausa et al. (2016), there was some evidence of explicit and loose teaching of problem-solving skills procedures in the Yakubova and Zeleke (2016) study similar to the current study. For example, the problem-solving steps outlined in the Yakubova and Zeleke (2016) study included (1) identifying a problem, (2) identifying a solution, and (3) checking if a problem is solved. These steps in the Yakubova and Zeleke (2016) study are similar to the present study's three-step problem-solving process; however, it is important to note that they did not specifically use the SDLM to teach problem-solving behaviors. Both studies found that participants generalized the skills learned into a second untrained setting. The generalized problem-solving skill behavior in both studies may be attributed to the explicit and loose teaching of problem-solving skills.

Therefore, the results from this study converge with findings from some past studies involving problem-solving skills (Morgan & Salzberg, 1992; Rausa et al., 2016; Yakubova & Zeleke, 2016). While there were some slight variations in the outcome across the previous problem-solving literature that applied VM (Morgan & Salzberg, 1992; Rausa et al., 2016; Yakubova & Zeleke, 2016), taken as a whole, the body of extant research suggests that there are benefits from using VM to teach problem-solving as a soft skill for employment to transition-aged students with a diagnosis of ASD and/or IDD. Specifically, through the current study's findings, the researcher has extended the previous findings by utilizing an evidence-based approach to teaching problem-solving skills (i.e., a SDLM) in the VMs presented via a virtual learning platform.
Contribution to Self-Determination Literature

Researchers and practitioners cannot overlook the importance of self-determination skills in the lives of individuals with ASD and/or IDD as in-school predictors of post-school success (Mazzotti, Rowe, Sinclair, et al., 2016; Mazzotti, Rowe, Kwiatek, et al., 2021; Rowe et al., 2021). A representative sample of studies has addressed its value to post-school outcomes of individuals with cognitive disabilities (Lachapelle et al., 2005; Martorell et al., 2008; Powers et al., 2012; Wehmeyer & Palmer, 2003; Wehmeyer & Schwartz, 1997). Also, Shogren et al. (2015) analyzed the relationships between self-determination and post-school outcomes of youth with disabilities. They established that upon graduating high school, students with disabilities who were self-determined experienced positive outcomes in employment and community access one year after graduation. Shrogen et al. (2015) findings point to the need for transition practitioners to expose their students with ASD and/or IDD to self-determination interventions because doing so may increase the student's chances of success in employment and independent living post-high school.

This study, therefore, adds to the literature about self-determination in general since problem-solving is an integral constituent of self-determination (Agran & Hughes, 1997; Cote, 2011; Wehmeyer, Agran, et al., 2000). It also adds to the literature by using a SDLM of problem-solving instruction in VM demonstrations that have five distinct problem situations across all the VMs instead of three in the VMs, as was in Yakubova and Zeleke (2016), and by incorporating a generalization phase in a natural work experience environment for the participants to practice self-determination through the learned problem-solving skills. Teaching problem-solving skills using VM that utilized a SDLM of instruction may have equipped the participants in the current study with essential skills for self-determination that may be helpful for their future success, as
demonstrated by Shrogren et al. (2015). Problem-solving is an important self-determination and work-related soft skill because it may lay the foundation for all other learning (Peterson, 1996a; Palmer & Wehmeyer, 2002) that can be useful in a work environment throughout an individual with ASD and/or IDD's work life. An individual with ASD and/or IDD who is an effective problem solver will be able to set and attain goals, identify potential response alternatives in the decision-making process at work, and self-regulate their learning (Wehmeyer, Palmer, et al., 2000).

**Contribution to the Use of Technology in Learning**

Technology patterns and internet usage in learning have changed dramatically over the last decade (Kim et al., 2022; Munandar et al., 2020; Oliech & Oshokoya, 2021). However, despite advancements in educational technology and internet usage, there is still a wide gap in special educators' use of the existing technology to enhance curriculum access in their classrooms (Knight et al., 2019). Knight et al. (2019) established from a survey of 2429 special educators that only about 23.4 % used technology-aided instruction and intervention daily with students with ASD. Furthermore, about 26.4 % of special educators reported never using technology-aided instruction and intervention with their students. These figures are considerably low if we consider how technology has permeated different aspects of education, work, and life today. This study extends the existing video technology literature base by utilizing evidence-based VM intervention and contemporary learning technology to teach problem-solving skills as a soft skill for employment in a virtual learning environment.

Furthermore, technology-based instruction has also variously been identified as an evidence-based practice for students with ASD and/or IDD (Kim et al., 2022; Rowe et al., 2021; Spencer et al., 2014). The current study adds to the evidence base for using instructional
technology to teach transition program students with ASD and/or IDD employment-related soft skills via a single-subject design that utilizes high-quality standards (Ganz & Ayres, 2018; Horner et al., 2005; Kratochwill et al., 2010, Kratochwill et al., 2012; Tate et al., 2016).

**Implications of Study Findings**

This study's findings can potentially improve the understanding of using a VM intervention that integrates an evidence-based practice like the SDLM of problem-solving to teach other important soft skills and self-determination skills through a virtual learning environment. The following sections discuss the implication of the findings of this study.

**Implications for Practitioners**

The results of this study may impact practitioners in special education because they prove that teaching problem-solving skills as a soft skill for employment to students with ASD and/or IDD is possible in a virtual learning environment for students with specific soft skills or self-determination skills as a goal in their Individualized Education Programs (IEP). The study outcome also proves that when given appropriate learning tools, students with ASD and/or IDD can learn important soft skills through virtual learning platforms. Therefore, comprehensive transition program teachers/job coaches should endeavor to provide opportunities to practice soft skills and self-determination skills like problem-solving skills to their students with ASD and/or IDD through virtual learning platforms when the need arises. When students acquire soft skills and become self-determined through the ability to solve problems, they may become more functionally independent with improved adaptive and social functioning in their future work environments (Hedley et al., 2018; Van Laarhoven et al., 2018). Becoming more functionally independent combined with improved adaptive and social functioning may lead to a positive quality of life and lifestyle satisfaction post-high school (Shogren et al., 2015).
Teachers today are increasingly encouraged to teach self-determination skills to students with disabilities in their programs. Wehmeyer, Agran, et al. (2000) acknowledged that most teachers are familiar with self-determination and view it as essential, except they do not have the skills to develop instructional activities appropriate for students with ASD and/or IDD. The positive findings of the current study provide a solution to one of the several ways researchers can use to make teachers/job coaches understand the connection between self-determination and its other constituent skills (e.g., problem-solving). Understanding this connection can help teachers/job coaches develop appropriate instructional activities for students with ASD and/or IDD in their programs. Specifically, through this study and its findings, the researcher has possibly established one way to help teachers/job coaches understand that problem-solving is a meaningful skill for them to teach as a soft skill for competitive employment, using VM in a virtual learning environment.

The outcome of this study also provides evidence that despite lack of time to be in the community with their students, teachers/job coaches should strive in their teaching or practice to incorporate opportunities, supports, and accommodations for students with ASD and/or IDD to generalize the learned problem-solving skills in natural environments. In addition, this study's results support the need for comprehensive transition education practitioners to start teaching soft skills like problem-solving skills early in their programs to students with ASD and/or IDD. This need for an early start is because this study's evidence suggests that despite the short duration of the study, students made connections with other related events or tasks in their environments, as seen in the generalization and social validity measures.

Moreover, the results of this study add to several ways post-secondary transition programs can help enhance transition outcomes for students with ASD and/or IDD, as expected
by IDEA (2004) Indicator 13. Indicator 13 requires states to report the percent of youth annually with IEPs aged 16 and over with an IEP that includes appropriate measurable post-secondary goals that are annually updated based upon age-appropriate transition assessment [20 U.S.C. 1416(a)(3)(B)]. Through using VM and video assessment (VA) to teach, practice, and assess job-related soft skills like problem-solving skills and requesting help as components of self-determination and self-advocacy skills in a virtual learning platform, teachers/job coaches can develop measurable appropriate post-secondary goals based on age-appropriate transition assessments. They will also be able to apply effective strategies, as demonstrated in this study, to help students achieve the specific self-determination goals outlined in their IEPs. When teachers/job coaches do so, they will have relevant age-appropriate data to report about self-determination based on IDEA (2004) Indicator 13.

**Implications for Policy**

Federal legislation and policy exist to support technology availability, access, and use by students with disabilities across school programs (e.g., Americans with Disabilities Act (ADA; 2008); The Assistive Technology Act (ATA; 2004); Individuals with Disabilities Education Act (IDEA; 2004)) to enhance free and appropriate public education (FAPE) in the least restrictive environment (LRE). Despite the laws being clear about what constitutes FAPE and LRE, special education practitioners countrywide were still confused when circumstances compelled them to transition to remote learning because of COVID-19 in the spring of 2020. The United States Department of Education (DOE; 2020) would later provide special education practitioners with guidance through a supplemental fact sheet that clarified that offering FAPE services through distance instruction would not breach compliance with IDEA (2004), Section 504 of the Rehabilitation Act (Section 504), and Title II of ADA. Through the current study, the researcher
has proved that practitioners can teach important skills using VM and provide other transition-related services via online learning platforms to meet FAPE when needed. The findings thus align with existing policies regarding FAPE and LRE. Providing opportunities for individuals with cognitive disabilities to learn important work-related skills using VM through virtual learning platforms can reinforce the DOE (2020) clarifications and recommendations.

**Future recommendations**

The following sections discuss the recommendations for practice, future research, and policy based on the current study's findings.

**Recommendations for Practice**

While the researcher acknowledges that practitioners have reported that creating VMs and uploading them on virtual learning platforms can be daunting (Weng et al., 2014), the findings of this study demonstrate a need to encourage practitioners to use VM because of some potential benefits when used. As observed in this study, the benefits of using VM include the ability to use them repeatedly (reuse) and consistently with students in the same program (Domire & Wolfe, 2014), thereby saving practitioner time once they have developed the VMs. The teachers/job coaches involved in this study as observers also reported through the social validity questionnaires that they saw value in using VM and would consider using it in their practice. In addition, the VM seemed to have motivated the participants based on their observed reactions when they saw familiar faces in the video models at the beginning of the study. Also, VM is suitable for teaching problem-solving skills because of its ability to be formatted by breaking down problems/tasks into small, manageable steps, helping reduce the cognitive load an individual with ASD and/or IDD must put into remembering the subsequent stages of a job task (Park et al., 2019).
Transition-related personnel should therefore endeavor to use VM that applies SDLM to support post-secondary education employment and independent living readiness skills development amongst individuals with ASD and/or IDD. In addition, the practitioners can utilize VM by embedding it within the core curriculum in their everyday teaching of soft skills or self-determination skills that may lend themselves to learning using VM to enhance the students with disability's successful transition to competitive jobs or independent living post-high school.

**Recommendations for Research**

In light of this study's encouraging positive findings, some suggestions for future research can be derived. First, additional research is needed to examine other less researched soft skills other than problem-solving skills (e.g., decision-making skills, customer service skills, requesting assistance, and telephone skills). In replicating the present study using VM in a virtual learning platform to target other less studied soft skills, researchers should strive to improve and account for all the omissions identified in the limitations below, including variability in participant performance, internal validity, external validity, and measurement issues. Extension of this study with other less targeted soft skills described earlier in chapter two (e.g., decision-making skills, customer service skills, requesting assistance, and telephone skills) may help to build additional literature about soft skills and how to successfully teach them through virtual learning platform as was in the current study. When established, the literature will significantly contribute to the body of soft skills intervention research for individuals with ASD and/or IDD in post-secondary transition programs.

Second, future research should examine the effects of VM interventions that apply SDLM of instruction to teach problem-solving skills to populations of students with disabilities not included in the current study (e.g., learning disabilities, traumatic brain injury, orthopedic
impairment) yet may benefit from its findings. The researchers in future studies should replicate
the current study by factoring in the differences in gender, cultural orientation, race (e.g., native
Indian Americans, Black, and Hispanic), geographic location, and socioeconomic factors.

Third, given the success observed in the current study, there is a need for future
researchers to establish how a SDLM of instruction can be used to teach self-advocacy skills to
students in comprehensive transition programs so that they can request accommodations under
ADA when they get a competitive employment position. Additionally, researchers should seek
ways to establish through collaboration with comprehensive transition program practitioners how
to use VM to support remote work job activities through the SDLM of instruction.

Fourth, to promote problem-solving skills as a soft skill for employment amongst
students with ASD and/or IDD, research in comprehensive transition programs need to create by
embedding within the core curriculum environments and opportunities that explicitly and
implicitly teach the knowledge, skills, and attitudes relating to problem-solving in and out of the
classroom. Creating various educational activities and opportunities to teach, solve and apply
problem-solving skills to real work problems in a comprehensive transition program's curriculum
may further lead to increased self-determination among students with ASD and/or IDD.
Researchers should, therefore, take note of this opportunity by helping to establish how the
problem-solving opportunities based on actual work problems, students’ interests, preferences,
and needs as outlined in their IEPs can be embedded into the core curriculum without burdening
teachers with extra work.

Fifth, Future research should establish ways practitioners can use or replicate this study
outside of a virtual learning environment by allowing the participants to experience and solve
real problem situations in an actual work environment during the baseline, intervention, and
maintenance phases rather than use VA. When made, this adjustment will help researchers or practitioners measure problem-solving skill behavior directly rather than measure correct responses about what participants should do based on a VA, making data available about the effectiveness of the VM intervention that applies the SDLM in an actual work environment.

Finally, based on the observations and findings of the current study, researchers using single-subject design methodology in future problem-solving skills studies should rely more on designing problem-solving skills study measures that align with students' interests, preferences, and needs, as was in this study. Studies that researchers design should also be in line with quality standards recommended across various literature for single-subject study designs (Ganz & Ayres, 2018; Horner et al., 2005; Kratochwill et al., 2010; Kratochwill et al., 2012; Tate et al., 2016) as was in this study. Furthermore, researchers should adhere to methodological and qualitative indicators required for rigorous single-subject studies (Horner et al., 2005; Kratochwill et al., 2012) by reporting the effect sizes as done in this study to ease the process of aggregating intervention effects through systematic reviews and also to promote confidence and replicability of findings. Reporting effect sizes will also enhance the credibility of study findings that applied visual analysis considering the commentaries that have recently followed What Works Clearinghouse (WWC) Standards for Single-Case Research Design (Standards 4.1) omission of visual analysis in single-subject research design studies (Kratochwill et al., 2021).

**Recommendations for Policy**

Finally, while COVID-19 demonstrated that IDEA (2004) might not be conducive to an online setting, the findings of this study indicate otherwise. The results show the need for policy updates to reflect and acknowledge that transition personnel can effectively use VM through virtual learning platforms to provide a reliable pathway for collecting and reporting data relating
to Indicator 14. Future policy should acknowledge that VM can be used as an intervention with students with cognitive disabilities to increase success in Indicator 14. Indicator 14 requires states to report the percentage of youth who are no longer in secondary school yet had IEPs in effect when they left school and were either enrolled in higher education within one year of leaving high school, competitively employed or live independently [20 U.S.C. 1416(a)(3)(B)].

When practitioners use VM to teach important work-related skills, they may be equipping individuals with ASD and/or IDD with important skills that will help them transition smoothly into competitive employment or independent living, making data available for states to report relating to Indicator 14.

Limitations of the Study

Despite the positive outcomes that the researcher observed and reported in this study, four known limitations, including variability in participant performance, internal validity, external validity, and measurement issues, may interfere with the generalizability of its findings and are discussed in detail in the following sections.

Variability in Participant Performance

Despite the demonstrated intervention effect, the researcher observed slight differences in participant performance when introducing VM intervention. For instance, while each participant's performance met the criteria for the immediacy of effect following the researcher's introduction to the intervention, Homer's and Sarah's performance exhibited an increasing trend, unlike Queen and Sheeza's performance, which decreased in trend. However, the decreasing yet variable/unstable trend observed in Queen and Sheeza's performance did not interfere with the intervention effect, as their performance levels were still higher than the baseline. Also, Homer's
performance level was higher than the rest of the peer's performance at intervention, followed by Sheeza's, Queen's, and then Sarah's.

Sarah's unstable yet low performance might have been impacted by uncertainty about what video between VM and VA to respond to (i.e., cognitive inflexibility), the difference in working memory, or low motivation (see Jones et al., 2018; Miyake & Friedman, 2012). During the intervention, which started with a VM demonstration of problem-solving skills followed by video assessment (VA) questions, Sarah sometimes responded to what she observed in the VM rather than the VA questions. Furthermore, Sarah seemed to be hurrying to finish the tasks before her peers. Some of her responses pointed to rote memorization of possible solutions to problems in the VAs. For instance, an analysis of Sarah's response patterns shows that she mostly answered the third question (What should you do if you cannot solve the problem on your own?) in each VA correctly. However, Sarah did not realize that there were situations in which there was no problem. Therefore, she could not ask for help. In such cases (i.e., for complete problems), Sarah should have acknowledged the absence of a problem and moved on to other tasks, but she responded in the same manner as in previous problem situations (i.e., broken, missing, mismatched, and incomplete), inferring to potential memorization. Occasionally, because of the study design's repetitive nature, Sarah seemed distracted as she would write in her diary as the VM demonstration continued to play. Being distracted due to low motivation could have influenced Sarah's unstable yet low-performance levels, as she might have missed some key teaching points in the VM demonstration.

Queen's variable/unstable and low level of performance in comparison to her two peers' performance might be attributed to the difficulty in hearing sound from one of the video models (VMs), which the researcher might have inadvertently recorded at low volume. Each time the
specific VM played, Queen struggled with her headphones until the researcher eventually asked her to watch the video without headphones. After that time, most of the VM demonstration had run its course, leading to a loss of learning some key points relating to that specific VM. Another likely explanation for Queen's variable/unstable and low level of performance could be her confusion about where she should have placed some of the responses she gave (i.e., executive function challenges relating to memory). For example, she consistently answered questions about how to fix a problem instead of what she should do if she cannot fix the problem on her own and vice versa across the assessments.

Sheeza's level of performance might have been impacted by her worries and expressed concerns that it might not have been okay to answer the same questions in a similar pattern every day (self-doubt). As a result, Sheeza changed some of her previously correct responses in the subsequent sessions, leading to an unstable response pattern at intervention.

A potential explanation for Homer's unstable yet high-performance level is his high self-awareness and motivation. His heightened self-awareness and motivation were observed during the study when he asked if it was okay to change his responses in the subsequent sessions because he felt he was learning from his previous answers. Homer's motivation was evident in his concern about correct spelling since he used his phone to check the correct spelling for words. Furthermore, he could associate the problem-solving skills strategies taught via VMs with his experience at a job site before the study concluded. During the intervention, he reported to the researcher how he had applied the problem-solving skills he had been learning via the VMs to solve a vacuum malfunction at his apartment job site. Overall, a wide range of expected responses to moderately structured problems may also have led to differences in performance in general (Foshay & Kirkley, 2003).
Internal Validity

A second overarching limitation relates to the study's internal validity, one of the five participants dropped out during the second session of the study, forcing the researcher to make changes to the remaining four participants (e.g., sequence of presenting VAs and VMs) that may have impacted the study's outcomes despite having accounted for attrition at the proposal stage. Moreover, the use of contrived problem-solving situations in the VM and VA scenarios did not allow the researcher to account for extraneous variables like other co-workers, natural noises in a work environment, and time constraints that are likely to be a factor in a real-life work environment. This lack of accounting for extraneous variables in the VM and VA scenarios might negatively impact the study outcomes by leading the researcher to establish a significant experimental effect, unlike if they had accounted for the extraneous variables in the videos.

External Validity

The third limitation relates to external validity. Because the participants involved in this study were not from a diverse background (three white Americans and one Asian American) and the modeled activities were about tasks that they are interested in and familiar with given their cultural orientation, it might be difficult now to generalize the study's findings to other racial or cultural groups, tasks or situations. Furthermore, due to the Family Education Rights and Privacy Act (FERPA), and nondisclosure issues surrounding the release of information in student Individualized Education Programs (IEPs), the researcher could not tell if the participants in this study had another condition or disability in addition to ASD and/or IDD that might have influenced study findings either positively or negatively. The post-secondary transition program did not allow the researcher to receive the IEP. However, the administrator used the participant's IEP to determine if they met the outlined inclusion criteria. It is important to note that the post-
secondary transition education program location where the researcher recruited participants strictly serves/admits post-secondary transition-age students whose primary diagnosis is ASD and/or IDD. It would therefore be difficult to generalize this study's findings with other disability categories because the researcher conducted the study in a school that strictly serves individuals with ASD and IDD.

Equally important to note is that the researcher tasked the teachers/job coaches with arranging real work situations and collecting generalization data relating to each participant's problem-solving skill performance at their off-campus job sites. Unfortunately, the researcher could not accompany the participants and their teachers/job coaches to the actual work locations because of privacy and requirements for clearances that would require the researcher to wait for a long time beyond the study period to be involved in observations in the actual work environments. Furthermore, because the researcher did not accompany the teachers/job coaches to observe the generalization stage in an actual work experience location, they cannot say with utmost confidence that the teachers/job coaches used the same rigor as was in the baseline, intervention, and maintenance phases of the study.

The data that the teacher/job coach collected and reported at generalization did not pass through the interobserver agreement (IOA) process because, unlike the previous phases, there was no permanent product showing participant performance for the researcher to review with an observer following the generalization phase. This lack of fidelity checks and reliance on teacher/job coach observation to report generalization data may have resulted in inaccurate data reporting, which might lead to skepticism about adapting the study findings.
**Measurement Issues**

The fourth and final limitation of this study concerns measurement issues, including the validity of the baseline measures used, the researcher's decision not to calculate the correct and incorrect response rates to help evaluate the participant's skill development, the lack of clear evidence of measuring of the problem-solving skill behavior itself, and the use of a social validity measure that had a 3-point scale. The researcher discusses each of these limitations in detail below.

During the baseline phase, the researcher used problem situation baseline measure VA (see Appendix E) to establish each participant's number of correct responses to problem-solving skills procedures in a virtual learning environment/platform per session before VM intervention. The VA had three modified questions aligned with the SDLM of problem-solving instruction (i.e., (a) what is the problem? (b) how can I solve the problem and (c) what can I do if I cannot solve the problem on my own?). While the participant's level of performance was low, some of their responses (e.g., "I will ask for help") may have implied that they might have already known what to do if they did not know how to solve a problem. This situation may lead to doubt about the validity of the measures used at baseline.

Contrary to Cooper et al.'s (2020) recommendation, the researcher did not calculate the correct and incorrect response rates to help evaluate the participant's skill development, thereby calling for caution in interpreting this study outcome despite the high effect size reported in chapter four. The researcher did not calculate the correct and incorrect response rates because of the wide range of possible responses (declarative knowledge) that the participants could give about how they could solve a given problem in this study, making it unfair to have clear-cut yes or no responses. However, the researcher acknowledges that calculating correct and incorrect
measures/responses could provide crucial information for assessing a participant's progress, unlike the reported rate of responses alone. Calculating the correct and incorrect response rates could also provide the researcher with valuable data that they may use to assess the participant's fluent performance (Kubina, 2005). Additionally, while Cooper et al. (2020) warn against the use of rates to measure behaviors that occur within discreet trials, the researcher believed that the problem-solving skills situations contrived in this study were highly likely not to be opportunity bound as the participants could easily encounter them more than once during work.

Furthermore, the researcher acknowledges that because the participants demonstrated their correct response to problem-solving skill ability by responding to VA questions through a virtual learning platform (i.e., during baseline, intervention, and maintenance phases), the researcher was not able to directly measure the problem-solving skill behavior itself as would be applied in an actual job task. This lack of direct measurement of the participant’s problem-solving skills ability in real work problem situations out of a virtual learning environment may create some doubt as to whether the participant’s knowledge about the problem-solving skill procedures can translate into an actual work problem-solving situation over a long period unlike in generalization which was accomplished in one session.

Finally, the researcher used a 3-point Likert scale to measure social validity in this study (see Appendix J) to encourage teachers'/job coaches' responses considering their tight schedules and also because of ease of analysis. However, various literature discusses and cites the 3-point Likert scale as unreliable as it does not convey much important information or allow accounting for extreme responses and tends to frustrate and stifle respondents (Cox III, 1980; Lehman & Hulbert, 1972). Therefore, the measures used in this case might not have reflected the true attitudes of the participants and their job coaches/teachers as they included less information.
Conclusion

The prevalence of students with ASD and IDD has increased the need for effective interventions and support services for post-secondary education transition practitioners responsible for educating them (Wong et al., 2015). Moreover, this need for effective interventions became even more exigent during the spring 2020 transition to remote learning in most American schools due to the COVID-19 pandemic. Therefore, the researcher in this study came up with using VM within an online platform to teach problem-solving skills to students with ASD and/or IDD in a post-secondary education transition program as one strategy and solution to the need for effective interventions and support services for post-secondary education transition program students with ASD and/or IDD.

Using VMs in a virtual learning platform is beneficial due to VMs' reusable and portable technology, and they may also require a few personnel to implement and maintain (Mason et al., 2013). Moreover, the support for individuals with ASD and/or IDD in soft skills acquisition is even more vital to implement via VM because studies show these individuals with ASD and/or IDD to have an affinity for screen-based media (Mazurek et al., 2012; Ward et al., 2018). This affinity to screen-based media makes most VM interventions appropriate for individuals with ASD and/or IDD. However, using VM is not without limitations, including that some individuals with ASD and IDD have cognitive overloads, which might make watching an entire video sequence before engaging in the skill sequence problematic, and creating VMs can be daunting due to lack of time by teachers (Weng et al., 2014). Despite these limitations, the benefits of using VM in a virtual learning platform to teach soft skills for employment far outweigh the limitations. Therefore, researchers and practitioners should continue exploring VM's use in teaching other less studied soft skills for competitive employment (e.g., problem-solving,
decision-making, customer service, requesting assistance, etc.). In doing so, they will also endeavor to fulfill the accountability measures stipulated in the IDEA (2004) related to Indicator 13.

While problem-solving instruction using VM in and out of a virtual learning platform will help students with ASD and/or IDD to identify problems and their possible solutions, as proved in this study, practitioners should be aware that just because students with ASD and/or IDD know the problem-solving skills strategies does not mean they will apply them when conditions change. Therefore, teachers should provide students with multiple opportunities in environments where they can explicitly practice and demonstrate diverse problem-solving skills and behaviors. In addition, teachers must support their students' learning by teaching them how to apply different strategies to solve the poorly defined problems that may arise in their academic and employment environments. Meaning the VMs teachers use in virtual learning platforms to teach their students should teach problem-solving strategies loosely to the students. "Teaching loosely" means randomly varying noncritical aspects of the instructional setting observed in the VMs within and across teaching sessions to reduce the likelihood that the participants will memorize responses based on what they observe in the videos (Cooper et al., 2020). Teaching problem-solving skills loosely can enhance students' chance of generalizing the skills to new environments, as was demonstrated in this study.

This study not only aligns with and supports IDEA's (2004) accountability outcome measure requirements (i.e., Indicator 13) but also proves that special education teachers/job coaches can continue to provide access to FAPE effectively via virtual learning platforms without compromising the quality of services. In addition, when the students set and achieve their IEP goals because of uninterrupted learning, they will likely transition successfully into
various environments post-school, including competitive employment (Mazzotti, Rowe, Kwiatek, et al., 2021). Teachers can therefore continue to utilize the technology and strategies identified in this study without fear of going against some of the aspirations of the special education laws.

Moreover, researchers and practitioners should put a concerted effort into supporting soft skills acquisition among individuals with ASD and/or IDD. This effort is vital because hard skills alone may lead to a lack of employment or employment termination if not accompanied by competence in soft skills. Equally important, teaching problem-solving as a soft skill to individuals with ASD and IDD will contribute to a sense of purpose (Cote, 2011; Wehmeyer, Agran, et al., 2000), improve chances of gaining future competitive employment (Peterson, 1996a; Palmer & Wehmeyer, 2002), and potentially afford them opportunities in integrated settings as it will increase opportunities for self-advocacy (Cote, 2011). Consequently, obtaining and maintaining competitive employment because of adequate soft skills will further enhance the quality of life, self-esteem, and independence (Blustein, 2008) of a growing population of adults with ASD and IDD graduating from high school and post-secondary school environments at high rates today thanks to IDEA (2004) accountability measures.

For the contributions of this study to be considered significant in problem-solving skills literature, researchers should start to make new distinctions and create space for problem-solving in soft skills literature, as exemplified in the current study. The difference will be necessary because various researchers have identified problem-solving skills as soft skills across diverse literature (Leigh et al., 1999; Oliech & Oshokoya, 2021), yet the way it is researched and taught in different classrooms, as demonstrated by the reviewed literature, does not indicate that distinction. Foshay and Kirkley (2003) highlight the gravity of the situation by reporting that
teachers primarily focus on well-structured problem-solving procedures (e.g., cooking using a recipe book, folding laundry, etc.) while they fail to identify and teach moderately to poorly structured problem-solving. Practitioners' focus on well-structured problems is not suitable because problems encountered in competitive work will be on a continuum between structured and unstructured. Identifying and teaching moderately to poorly structured problem-solving, as was the case in the current study, may lead learners with ASD and/or IDD not only to perform many small routine job tasks but also help them to respond when conditions change or when a new problem situation arises (Foshay & Kirkley, 2003) in the absence of their job coaches.

In conclusion, transition program practitioners should recognize that all individuals with ASD and/or IDD have extraordinary vocational abilities to exploit in jobs that match their interests, needs, and skill sets (Dreaver et al., 2020; Walsh et al., 2014). Therefore, transition practitioners should strive to establish creative solutions to teach employment-related soft skills (Bross et al., 2019) that may hinder individuals with ASD and/or IDD from obtaining and maintaining competitive employment positions in their communities by identifying appropriate VM to support explicit soft skills training based on individual strength and preferences. This action might improve the future employment outcomes of these individuals with ASD and/or IDD despite the uncertain impact of the COVID-19 pandemic on future transition outcomes.
References


34 C.F.R. §361.5(c) (9) (i-iii)(2018). https://www.law.cornell.edu/cfr/text/34/361.5


https://doi.org/10.1162/089892901564289


https://doi.org/10.1177%2F07419325020230050301


https://www.ada.gov/pubs/adastatute08.htm


https://dx.doi.org/10.1901%2Fjaba.1968.1-91

https://doi.org/10.1901/jaba.1987.20-313

http://www.daddcec.com/uploads/2/5/2/0/2520220/etadd_september_54_3_2019.pdf#page=40


http://www.uky.edu/~eushe2/Bandura/Bandura1969HSTR.pdf


https://www.proquest.com/docview/1636228940?pq-origsite=gscholar&fromopenview=true
https://doi.org/10.1017/S2045796011000448


https://doi.org/10.1037/0003-066X.63.4.228

https://doi.org/10.1145/1070960.1070980

https://journals.sagepub.com/doi/pdf/10.1177/1088357618805990


https://doi.org/10.1002/pits.20618


Cimatti, B. (2016). Definition, development, assessment of soft skills and their role for the quality of organizations and enterprises. *International Journal for Quality Research, 10*(1). [http://dx.doi.org/10.18421/IJQR10.01-05](http://dx.doi.org/10.18421/IJQR10.01-05)


https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2730804/


https://doi.org/10.1177%2F1088357614547810


https://doi.org/10.1177%2F001440290507100202

https://books.google.com/books?id=bnP8WE95UO0C&lpg=PA73&ots=-XvdquwE5a&lr&pg=PA73#v=onepage&q&f=false

https://www.proquest.com/docview/305352591?pq-origsite=gscholar&fromopenview=true


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https://doi.org/10.1177/001440290507100203


https://doi.org/10.1177%2F2165143419828983


https://doi.org/10.1177%2F001440290507100203


https://doi.org/10.1111/j.1469-7610.2004.00215.x


https://doi.org/10.1901/jaba.1989.22-365


https://doi.org/10.1177%2F1362361301005001002


https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2765385/

https://doi.org/10.4324/9781410605962

https://doi.org/10.1111/j.1365-2788.2008.01098.x

https://doi.org/10.1177/0741932513486298


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https://doi.org/10.1016/j.jsp.2013.11.005


https://doi.org/10.3758/s13428-011-0111-y


https://doi.org/10.1177/0022466913489733


https://doi.org/10.1007/s10864-005-6297-2


https://ies.ed.gov/ncee/wwc/handbooks


Appendix A. Inter-observer Agreement Form (IOA)

Observer: _______________________ Researcher: ______________________
Session ___________ Phase ___________ Date: ___________________

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Appendix B. Research Study Recruitment Letter

Dear XXX

I would like to invite you to participate in a study that will teach you how to solve work-related problems using video modeling to help you acquire and maintain a job in the future. The study will be conducted on a virtual learning platform (Zoom and Nearpod app) using a computer or a smartphone for about 40 minutes each day for 7 weeks. You will be watching a short video clip that demonstrates how to solve a work problem, then present what you have watched in the subsequent video assessment and during a verbal assessment at your on-campus job experience real work situation.

If chosen to participate in this study, you will undergo training about using technology (Nearpod and Zoom) before the study begins. Participation in this study is completely voluntary, and you will be able to withdraw at any time for any reason without any penalty. All personal information, including but not limited to your identity, will be protected. If you are interested in participating, you can contact Cliff Oliech at 240–633–9474 or oliechc@duq.edu to answer any questions that you may have. Thank you!

Sincerely,

Cliff Oliech
Principal investigator for the study
Duquesne University, PA.
TITLE: Teaching Problem-Solving Skills Using Video Modelling in a Virtual Learning Environment

WHO IS DOING THE RESEARCH?
Cliff G. Oliech, Ph.D. Candidate in Special Education, School of Education, olieche@duq.edu

ADVISOR:
Dr. Bridget Green, Professor of Special Education, School of Education, greenb@duq.edu
724.612.2588

SOURCE OF SUPPORT:
This study is being performed as partial fulfillment of the doctoral degree in Special Education requirements at Duquesne University and is not supported by any grants or outside funding.

STUDY OVERVIEW:
This study is about how your child can learn to solve problems in a work situation. The purpose will be to establish ways to teach your child problem-solving skill strategies in a virtual learning environment (online) so that they will continue to learn despite the looming COVID-19 interferences with their school schedule. Problems will arise at work all the time, and if your child does not know how to solve them or ask for help when they arise, they will risk losing their job. In this study, your child will learn how to solve different work-related problems by watching a video model teaching problem-solving skills procedures on a computer or a smartphone, following which, they will answer questions included in video assessment clips to show what they have learned by watching the video model. This study will include five and not less than three students with autism intellectual and developmental disabilities.

WHY IS THIS RESEARCH STUDY BEING DONE?
Your child is being asked to participate in this study that seeks to determine the effectiveness of using video modeling to teach problem-solving as a soft skill for employment to transition-aged individuals diagnosed with ASD and or IDD in a virtual learning platform.
For your child to participate in this study, they must:
   a) Be between 18 and 21 years old.
   b) Be a student in a post-secondary education (PSE) transition program.
   c) Have basic language abilities (reading, writing, and speaking) as indicated in their IEPs.
   d) Be able to respond to a request to operate a computer, iPad, or smartphone (typing or speaking through a computer microphone onscreen).
   e) Be able to follow simple directions, including logging into the computer and using the appropriate codes to get into an online class.

WHAT WILL MY CHILD BE ASKED TO DO?
The things your child will be asked to do in this study include:
   1) Practice how to use the technology we will be using in this study (i.e., Nearpod App and Zoom).
      Their teacher or job coach will teach them how to use the technology.
2) Respond to five questions before the study begins to determine what they know about problem-solving skills and after the study ends to determine what they have learned about problem-solving skills after watching the video models. A job coach or teacher will be present to support them when responding.

3) Repeatedly watch three different segments of video assessment clips with three questions at the end of each segment for six minutes during the first three stages of the study.

4) Answer the three video assessment questions at the end of each video clip segment by speaking into an onscreen microphone or typing on a keyboard to record their responses. They will have about 4 minutes to respond to the questions at the end of each segment.

5) Repeatedly watch a video model demonstration teaching problem-solving skill performance for about six minutes during each session of the second stage of the study.

6) Visit an actual work location with their job coach once for about 30 minutes in the last stage of the study. After that, they will be required to solve a pre-arranged real work problem using similar strategies taught via video modeling.

7) Answer three verbal (oral) assessment questions provided by their job coach during the visit to an actual work location at the last stage of the study.

8) Answer a social validity questionnaire once for about 10 minutes about whether they agree or disagree with the study. A job coach will be present to help them.

**How many assessments will my child be given?**

Your child will be given four different assessments during the different phases of the study, including:

1) Two problem-solving skills questionnaires.
   - The questionnaire will have five questions that will help the researcher determine what your child knows about solving problems before the study begins and what they have learned about problem-solving after the study ends.
   - The responses from these questionnaires will also help the researcher decide the amount of time and resources to teach your child problem-solving skills and strategies and what to include in the video modeling demonstration and assessments described below.

2) A five series video assessments on a computer or smartphone.
   - The video assessments will be a short 1-2-minute long video clip showing your child a work activity that might be a problem. At the end of the video clip, three different questions (i.e., what is the problem, how can you solve the problem, and what should you do if you cannot solve the problem?) will come up on the screen for your child to answer about what they have seen in the video.
   - Your child will be repeatedly given the video assessments during the first three phases of the study for about 18 minutes.

3) One verbal (oral) assessment when doing real work on campus.
   - The oral assessment will constitute three questions that your child will be asked by the job coach or researcher when they encounter a real work problem at an on-campus work experience location. The questions will include:
     a) What is the problem (i.e., problem identification)?
     b) How can you solve the problem? (Problem solution)
     c) What should you do if you cannot solve the problem yourself? (i.e., alternative solutions)

4) One social validity questionnaire at the end of the study.
   - The social validity questionnaire will include six questions about whether your child liked or did not like the study. A job coach will be present to help them respond to the questions.
What will be in the video modeling clip that my child will be shown?

• The video modeling clip will have age-appropriate models teaching your child the best way to solve different work-related problems using a 3-step procedure/process.
• By watching the models solve the problems, your child will learn how to solve the problems presented in the video, oral assessments, and future employment situations.

Where will the study happen?

• This study will happen at your child's school and their on-campus job experience location.
• The study will be embedded into the daily school or class schedule and will supplement the learning that happens daily in class.
• If your child cannot come to school due to sickness or isolation, they will still access the lesson from home using their computer, iPad, or smartphone with your help if necessary.
• Your child will be learning the same way they do every day in their classroom, using a computer, iPad, or smartphone to access the lessons and learning material online.

For how long my child participate in this study?

• Your child will be required to participate for about 37 days. There will only be one session per day. Each session per day will not last more than 40 minutes. These are the only requests that will be made for your child.

WHAT ARE THE RISKS AND BENEFITS OF THIS STUDY?

Could my child be harmed by participating in this study?

• This study has minimal risks. The researcher will not record any video of your child.
• The researcher will ensure confidentiality of the data they collect from your child by assigning pseudonyms, averting the risk of breach of privacy.
• Only the researcher will have access to the responses your child gives online.

What are the benefits of my child participating in this study?

• Your child's participation in this study will increase their chances of getting and maintaining a job after graduation.
• If your child gets and maintains a job because of participating in this study, the gap in employment between individuals with autism or intellectual and developmental disabilities and their peers with other disabilities or non-disabled peers will decrease.
• Your child's participation will increase accountability in teaching individuals with disabilities attending post-secondary education institutions during the COVID-19 pandemic.
• Your child's participation will also help to entrench literature about using video modeling interventions to teach problem-solving as a soft skill necessary for employing individuals with autism and intellectual disabilities in a virtual learning environment using accessible technology.
• Lastly, your child's participation will help teachers find appropriate solutions for using technology to teach post-secondary education transition program students virtually when there are still looming COVID-19 interferences with school attendance.

WILL MY CHILD BE PAID FOR TAKING PART IN THIS RESEARCH STUDY?

• No, your child will not be paid for participating in this study.
• There are also no costs to you or your child participating in this study.
CONFIDENTIALITY:

How will my child's identity be protected?

- Your child's participation in this study, and any identifiable personal information they provide, will be kept confidential to every extent possible and will be destroyed within two years after the data collection. There will not be any video recording of the sessions.
- Your child will be given a pseudo name to use. Their real name will not appear on any questionnaires or the downloaded assessment reports.
- Only the researcher will have access to any identifiable information.

Who will know what my child did or said in this study?

- Only the researcher, teacher, or job coach working directly with your child will know what they said.
- Responses shared with other professionals or in a dissertation will be in statistical data summary formats without any identifiable information.

How will you store the information you collect about my child?

- All written, electronic forms and study materials will be kept secure in a password-protected computer and university-provided cloud storage unique to the researcher's account and credentials.
- After each session, the researcher will download the responses and store them in a password protected computer for further analysis. The researcher will destroy the responses or any identifying data within two years of collecting and analyzing data.

RIGHT TO WITHDRAW:

Can my child quit if they want to?

- Yes, your child can leave anytime they want to.
- There will be no penalty or consequence if they choose to leave.

What should I do if my child wants to quit?

- Just let the researcher, teacher, or job coach know about their intention to leave.
- You can also contact the researcher directly at 240.633.9474 or olieche@duq.edu. What will happen to my child's data if they leave?
- All the incomplete data from your child's withdrawal from the study will not be analyzed or reported.
- All the data or identifying information collected about your child until they intend to withdraw will be kept or destroyed as outlined in the confidentiality section.

SUMMARY OF RESULTS:

Can I find out what you discovered from the study?

Yes, a summary of the results of this research study will be supplied to you and your child, at no cost, upon request.

FUTURE USE OF DATA:

Will my child's identity be known in the data stored for future use?

- Any information collected that can identify your child will have the identifiers removed and be kept for use in future related studies (within two years.) Will the stored data be shared with other researchers?
- No, the researcher will not share the stored data in this study with any other researchers except in analyzed format as presented in published research studies.
How will the data be used in the future?
• The researcher may use the data to expand the analysis of specific areas of the study that will not be targeted in this study—for example, an analysis of your child's response patterns.

COVID-19 CONSIDERATIONS
What measures will you take to protect my child from COVID-19?
• This study will be conducted in a virtual learning environment (via Zoom and Nearpod) for most of the study with minimal face-to-face interactions between the researcher and participants, thereby reducing the risks of COVID-19.
• There will also be a few participants in this study (i.e., about 3-5), reducing the risk of spreading the virus.
• During the generalization phase of the study, when your child will be observed in an actual on campus work location, the researcher will adhere to Duquesne University's existing COVID-19 protocol procedures.

VOLUNTARY CONSENT:
I have read the above statements and understand what is being requested of me and my child. I also understand that my child's participation is voluntary and that I am free to withdraw my permission for my child at any time, for any reason, without any consequences.
On these terms, I agree that I am willing to allow my child to participate in this research project. I understand that should I have any further questions about my child's participation in this study, I may contact Cliff Oliech at 240.633.9474, or oliechc@duq.edu or Dr. Bridget Green at 724.612.2588 or greenb@duq.edu. Should I have questions regarding protection of human subject issues, I may contact Dr. David Delmonico, Chair of the Duquesne University Institutional Review Board, at 412.396.1886.

_________________________________________________________  ____________________
Parent / Legal Guardian’s Signature                      Date

_________________________________________________________  ____________________
Researcher's Signature                                    Date
Appendix D. Pre- and Post-Intervention Problem-Solving Questionnaire

Phase: __________ Date: ___________________

Observer: _________ Researcher: _______
Participant __________________________

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is a problem?</td>
<td></td>
</tr>
<tr>
<td>Can you name a problem you have experienced at work?</td>
<td></td>
</tr>
<tr>
<td>How can you fix the problem?</td>
<td></td>
</tr>
<tr>
<td>Will it work? /Did it work?</td>
<td></td>
</tr>
<tr>
<td>Did you ask for help with your problem?</td>
<td></td>
</tr>
</tbody>
</table>
Appendix E. Problem Situation Baseline Measure - Video Assessment

Problem-solving Situation Baseline Measure Form **Sequence No. 1**

Phase: ____________ Date: __________________
Observer: __________ Researcher: __________
Participant ____________________ Video Assessment No. ______

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(Scene 1) Missing material</strong></td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>In the process of working, staples run out, and Faith needs to fill new ones into the stapler, but she cannot find any on her desk (missing staples)</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
<tr>
<td><strong>(Scene 2) Broken material</strong></td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>Joyce starts to vacuum the floor when she learns that the vacuum cannot start (Broken Vacuum).</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
<tr>
<td><strong>(Scene 3) Mismatched material</strong></td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>Joan has been asked to place some black pepper on a table when she realizes that the container she has chosen while labeled pepper, has salt in it.</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
</tbody>
</table>
**Problem Situation Baseline Measure - Video Assessment Sequence No. 2**

**Problem-solving Situation Baseline Measure Form**

<table>
<thead>
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<th>Phase:</th>
<th>Date:</th>
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</thead>
<tbody>
<tr>
<td>Observer:</td>
<td>Researcher:</td>
</tr>
<tr>
<td>Participant</td>
<td>Video Assessment No:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(Scene 1) Complete material</strong></td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>Daniel has been asked to refill the bathroom with toilet paper, soap, and paper towels. However, he finds the bathroom has all the necessary supplies.</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
<tr>
<td><strong>(Scene 2) Incomplete/Partially complete material</strong></td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>Peter has been asked to sort the letters into two piles, one pile for Canevin Hall and one pile for Fisher Hall. However, Peter notices the piles have already been started with 3 letters in each pile.</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
<tr>
<td><strong>(Scene 3) Missing material</strong></td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>In the process of working, staples run out, and Faith needs to fill new ones into the stapler, but she cannot find any on her desk (missing staples)</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
</tbody>
</table>

208
### Problem Situation Baseline Measure - Video Assessment Sequence No. 3

#### Problem-solving Situation Baseline Measure Form

- **Phase:**
- **Date:**
- **Observer:**
- **Researcher:**
- **Participant:**
- **Video Assessment No.:**

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Scene 1) Broken material</td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>Joyce starts to vacuum the floor when she learns that the vacuum cannot start (Broken Vacuum).</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
<tr>
<td>(Scene 2) Mismatched material</td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>Joan has been asked to place some black pepper on a table when she realizes that the container she has chosen while labeled pepper, has salt in it.</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
<tr>
<td>(Scene 3) Complete material</td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>Daniel has been asked to refill the bathroom with toilet paper, soap, and paper towels. However, he finds the bathroom has all the necessary supplies.</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
</tbody>
</table>
### Problem Situation Baseline Measure - Video Assessment Sequence No. 4

**Problem-solving Situation Baseline Measure Form**

Phase: __________ Date: ___________________
Observer: _________ Researcher: _______
Participant ________________________ Video Assessment No. ______

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Scene 1) Incomplete/partially complete material</td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td>Peter has been asked to sort the letters into two</td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
<tr>
<td>piles, one pile for Canevin Hall and one pile for</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher Hall. However, Peter notices the piles have</td>
<td></td>
<td></td>
</tr>
<tr>
<td>already been started with 3 letters in each pile.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Scene 2) Missing material</td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>In the process of working, staples run out, and</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td>Faith needs to fill new ones into the stapler, but</td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
<tr>
<td>she cannot find any on her desk (missing staples)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Scene 3) Broken material</td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>Joyce starts to vacuum the floor when she learns</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td>that the vacuum cannot start (Broken Vacuum)</td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
</tbody>
</table>
Problem Situation Baseline Measure - Video Assessment **Sequence No. 5**

Problem-solving Situation Baseline Measure Form

| Phase: ____________ Date: ___________________
| Observer: _________ Researcher: _______
| Participant ________________________ Video Assessment No. _____ |

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Scene 1) Mismatched material</td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>Joan has been asked to place some black pepper on a table when she realizes that the container she has chosen while labeled pepper, has salt in it.</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
<tr>
<td>(Scene 2) Complete material</td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>Daniel has been asked to refill the bathroom with toilet paper, soap, and paper towels. However, he finds the bathroom has all the necessary supplies.</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
<tr>
<td>(Scene 3) Incomplete/Partially complete material</td>
<td>1. What do you notice?</td>
<td></td>
</tr>
<tr>
<td>Peter has been asked to sort the letters into two piles, one pile for Canevin Hall and one pile for Fisher Hall. However, Peter notices the piles have already been started with 3 letters in each pile.</td>
<td>2. What should happen?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What if it doesn’t happen?</td>
<td></td>
</tr>
</tbody>
</table>
Appendix F. Problem Situation Intervention Measure

Video Assessment Sequence No. 1

Problem-solving Situation Intervention Measure Form
Phase: ____________ Date: ________________
Observer: _________ Researcher: _______
Participant ________________________ Video Assessment No. ____

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
</table>
| (Scene 1) Missing material | 1. What is the problem?  
In the process of working, staples run out, and Faith needs to fill new ones into the stapler, but she cannot find any on her desk (missing staples) |             |
|                            | 2. How can you fix the problem?                                           |             |
|                            | 3. What should you do if you cannot fix the problem?                       |             |
| (Scene 2) Broken material  | 1. What is the problem?  
Joyce starts to vacuum the floor when she learns that the vacuum cannot start (Broken Vacuum). |             |
|                            | 2. How can you fix the problem?                                           |             |
|                            | 3. What should you do if you cannot fix the problem?                       |             |
| (Scene 3) Mismatched material | 1. What is the problem?  
Joan has been asked to place some black pepper on a table when she realizes that the container she has chosen while labeled pepper, has salt in it. |             |
|                            | 2. How can you fix the problem?                                           |             |
|                            | 3. What should you do if you cannot fix the problem?                       |             |
## Problem Situation Intervention Measure - Video Assessment Sequence No. 2

**Problem-solving Situation Intervention Measure Form**  
Phase: ____________ Date: ______________  
Observer: ________ Researcher: ________  
Participant ________________________ Video Assessment No. ______

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
</table>
| (Scene 1) Complete material | Daniel has been asked to refill the bathroom with toilet paper, soap, and paper towels. However, he finds the bathroom has all the necessary supplies. | 1. What is the problem?  
2. How can you fix the problem?  
3. What should you do if you cannot fix the problem? |
| (Scene 2) Incomplete/Partially complete material | Peter has been asked to sort the letters into two piles, one pile for Canevin Hall and one pile for Fisher Hall. However, Peter notices the piles have already been started with 3 letters in each pile. | 1. What is the problem?  
2. How can you fix the problem?  
3. What should you do if you cannot fix the problem? |
| (Scene 3) Missing material | In the process of working, staples run out, and Faith needs to fill new ones into the stapler, but she cannot find any on her desk (missing staples) | 1. What is the problem?  
2. How can you fix the problem?  
3. What should you do if you cannot fix the problem? |
Problem Situation Intervention Measure - Video Assessment Sequence No. 3

Problem-solving Situation Intervention Measure Form
Phase: ____________ Date: __________________
Observer: _________ Researcher: _______
Participant ________________________ Video Assessment No. ______

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Scene 1) Broken material</td>
<td>1. What is the problem?</td>
<td></td>
</tr>
<tr>
<td>Joyce starts to vacuum the floor when she learns that the vacuum cannot start (Broken Vacuum).</td>
<td>2. How can you fix the problem?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What should you do if you cannot fix the problem?</td>
<td></td>
</tr>
<tr>
<td>(Scene 2) Mismatched material</td>
<td>1. What is the problem?</td>
<td></td>
</tr>
<tr>
<td>Joan has been asked to place some black pepper on a table when she realizes that the container she has chosen while labeled pepper, has salt in it.</td>
<td>2. How can you fix the problem?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What should you do if you cannot fix the problem?</td>
<td></td>
</tr>
<tr>
<td>(Scene 3) Complete material</td>
<td>1. What is the problem?</td>
<td></td>
</tr>
<tr>
<td>Daniel has been asked to refill the bathroom with toilet paper, soap, and paper towels. However, he finds the bathroom has all the necessary supplies.</td>
<td>2. How can you fix the problem?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What should you do if you cannot fix the problem?</td>
<td></td>
</tr>
</tbody>
</table>
Problem Situation Intervention Measure - Video Assessment Sequence No. 4

Problem-solving Situation Intervention Measure Form
Phase: ____________ Date: ________________
Observer: _________ Researcher: _________
Participant ________________________ Video Assessment No. ______

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Scene 1) Incomplete/partially complete material</td>
<td>1. What is the problem?</td>
<td></td>
</tr>
<tr>
<td>Peter has been asked to sort the letters into two</td>
<td>2. How can you fix the problem?</td>
<td></td>
</tr>
<tr>
<td>piles, one pile for Canevin Hall and one pile for</td>
<td>3. What should you do if you cannot fix the</td>
<td></td>
</tr>
<tr>
<td>Fisher Hall. However, Peter notices the piles have</td>
<td>problem?</td>
<td></td>
</tr>
<tr>
<td>already been started with 3 letters in each pile.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Scene 2) Missing material</td>
<td>1. What is the problem?</td>
<td></td>
</tr>
<tr>
<td>In the process of working, staples run out, and</td>
<td>2. How can you fix the problem?</td>
<td></td>
</tr>
<tr>
<td>Faith needs to fill new ones into the stapler, but</td>
<td>3. What should you do if you cannot fix the</td>
<td></td>
</tr>
<tr>
<td>she cannot find any on her desk (missing staples).</td>
<td>problem?</td>
<td></td>
</tr>
<tr>
<td>(Scene 3) Broken material</td>
<td>1. What is the problem?</td>
<td></td>
</tr>
<tr>
<td>Joyce starts to vacuum the floor when she learns that</td>
<td>2. How can you fix the problem?</td>
<td></td>
</tr>
<tr>
<td>the vacuum cannot start (Broken Vacuum).</td>
<td>3. What should you do if you cannot fix the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>problem?</td>
<td></td>
</tr>
</tbody>
</table>
Problem Situation Intervention Measure - Video Assessment Sequence No. 5

Problem-solving Situation Intervention Measure Form

<table>
<thead>
<tr>
<th>Phase:</th>
<th>Date:</th>
<th>Observer:</th>
<th>Researcher:</th>
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<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Participant</td>
<td></td>
<td>Video Assessment No.</td>
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<tr>
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<td></td>
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<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Scene 1) Mismatched material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joan has been asked to place some black pepper on a table when she realizes that the container she has chosen while labeled pepper, has salt in it.</td>
<td>1. What is the problem?</td>
<td></td>
</tr>
<tr>
<td>(Scene 2) Complete material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daniel has been asked to refill the bathroom with toilet paper, soap, and paper towels. However, he finds the bathroom has all the necessary supplies.</td>
<td>1. What is the problem?</td>
<td></td>
</tr>
<tr>
<td>(Scene 3) Incomplete/Partially complete material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peter has been asked to sort the letters into two piles, one pile for Canevin Hall and one pile for Fisher Hall. However, Peter notices the piles have already been started with 3 letters in each pile.</td>
<td>1. What is the problem?</td>
<td></td>
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</table>

216
# Problem Situation Maintenance Measure

## Video Assessment Sequence No. 1

Problem-solving Situation Maintenance Measure Form

<table>
<thead>
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<th>Date: ___________________</th>
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<tbody>
<tr>
<td>Observer: _________</td>
<td>Researcher: _______</td>
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<tr>
<td>Participant __________</td>
<td>Video Assessment No. ______</td>
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<table>
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<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Scene 1) Missing material</td>
<td>1. What is the problem? 2. How can you fix the problem? 3. What should you do if you cannot fix the problem?</td>
<td></td>
</tr>
<tr>
<td>In the process of working, staples run out, and Faith needs to fill new ones into the stapler, but she cannot find any on her desk (missing staples).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Scene 2) Broken material</td>
<td>1. What is the problem? 2. How can you fix the problem? 3. What should you do if you cannot fix the problem?</td>
<td></td>
</tr>
<tr>
<td>Joyce starts to vacuum the floor when she learns that the vacuum cannot start (Broken Vacuum).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Scene 3) Mismatched material</td>
<td>1. What is the problem? 2. How can you fix the problem? 3. What should you do if you cannot fix the problem?</td>
<td></td>
</tr>
<tr>
<td>Joan has been asked to place some black pepper on a table when she realizes that the container she has chosen while labeled pepper, has salt in it.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Problem Situation Maintenance Measure - Video Assessment Sequence No. 2**

Problem-solving Situation Maintenance Measure Form
Phase: ____________ Date: ________________
Observer: _________ Researcher: _______
Participant ________________________ Video Assessment No. ______

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(Scene 1) Complete material</strong></td>
<td>Daniel has been asked to refill the bathroom with toilet paper, soap, and paper towels. However, he finds the bathroom has all the necessary supplies.</td>
<td>1. What is the problem?</td>
</tr>
<tr>
<td></td>
<td>2. How can you fix the problem?</td>
<td>3. What should you do if you cannot fix the problem?</td>
</tr>
<tr>
<td><strong>(Scene 2) Incomplete/Partially complete material</strong></td>
<td>Peter has been asked to sort the letters into two piles, one pile for Canevin Hall and one pile for Fisher Hall. However, Peter notices the piles have already been started with 3 letters in each pile.</td>
<td>1. What is the problem?</td>
</tr>
<tr>
<td></td>
<td>2. How can you fix the problem?</td>
<td>3. What should you do if you cannot fix the problem?</td>
</tr>
<tr>
<td><strong>(Scene 3) Missing material</strong></td>
<td>In the process of working, staples run out, and Faith needs to fill new ones into the stapler, but she cannot find any on her desk (missing staples).</td>
<td>1. What is the problem?</td>
</tr>
<tr>
<td></td>
<td>2. How can you fix the problem?</td>
<td>3. What should you do if you cannot fix the problem?</td>
</tr>
</tbody>
</table>
Problem Situation Maintenance Measure - Video Assessment **Sequence No. 3**

Problem-solving Situation Maintenance Measure Form
Phase: ____________ Date: ________________
Observer: _________ Researcher: _______
Participant ________________________ Video Assessment No. ______

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(Scene 1) Broken material</strong></td>
<td>Joyce starts to vacuum the floor when she learns that the vacuum cannot start (Broken Vacuum).</td>
<td>1. What is the problem?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>(Scene 2) Mismatched material</strong></td>
<td>Joan has been asked to place some black pepper on a table when she realizes that the container she has chosen while labeled pepper, has salt in it.</td>
<td>1. What is the problem?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>(Scene 3) Complete material</strong></td>
<td>Daniel has been asked to refill the bathroom with toilet paper, soap, and paper towels. However, he finds the bathroom has all the necessary supplies.</td>
<td>1. What is the problem?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Problem Situation Maintenance Measure - Video Assessment Sequence No. 4

Problem-solving Situation Maintenance Measure Form
Phase: ____________ Date: ___________________
Observer: _________ Researcher: _______
Participant ________________________ Video Assessment No. ______

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Grade (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Scene 1) Incomplete/partially complete material</td>
<td>1. What is the problem?</td>
<td></td>
</tr>
<tr>
<td>Peter has been asked to sort the letters into two</td>
<td>2. How can you fix the problem?</td>
<td></td>
</tr>
<tr>
<td>piles, one pile for Canevin Hall and one pile for</td>
<td>3. What should you do if you cannot fix the</td>
<td></td>
</tr>
<tr>
<td>Fisher Hall. However, Peter notices the piles</td>
<td>problem?</td>
<td></td>
</tr>
<tr>
<td>have already been started with 3 letters in each pile.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Scene 2) Missing material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In the process of working, staples run out, and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faith needs to fill new ones into the stapler, but</td>
<td></td>
<td></td>
</tr>
<tr>
<td>she cannot find any on her desk (missing staples).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Scene 3) Broken material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joyce starts to vacuum the floor when she learns that</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the vacuum cannot start (Broken Vacuum).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. How can you fix the problem?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What should you do if you cannot fix the</td>
<td></td>
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<tr>
<td></td>
<td>problem?</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. What is the problem?</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. How can you fix the problem?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What should you do if you cannot fix the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>problem?</td>
<td></td>
</tr>
<tr>
<td>Problem situation</td>
<td>Questions</td>
<td>Grade (+/-)</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>(Scene 1) Mismatched material</td>
<td>1. What is the problem?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. How can you fix the problem?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What should you do if you cannot fix the problem?</td>
<td></td>
</tr>
<tr>
<td>Joan has been asked to place some black pepper on a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>table when she realizes that the container she has</td>
<td></td>
<td></td>
</tr>
<tr>
<td>chosen while labeled pepper, has salt in it.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Scene 2) Complete material</td>
<td>1. What is the problem?</td>
<td></td>
</tr>
<tr>
<td>Daniel has been asked to refill the bathroom with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>toilet paper, soap, and paper towels. However, he</td>
<td></td>
<td></td>
</tr>
<tr>
<td>finds the bathroom has all the necessary supplies.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Scene 3) Incomplete/Partially complete material</td>
<td>1. What is the problem?</td>
<td></td>
</tr>
<tr>
<td>Peter has been asked to sort the letters into two</td>
<td></td>
<td></td>
</tr>
<tr>
<td>piles, one pile for Canevin Hall and one pile for</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher Hall. However, Peter notices the piles have</td>
<td></td>
<td></td>
</tr>
<tr>
<td>already been started with 3 letters in each pile.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. How can you fix the problem?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What should you do if you cannot fix the problem?</td>
<td></td>
</tr>
</tbody>
</table>
Appendix H. Problem-Solving Situation Generalization Measure

Contrived Work Problem Assessment

Problem-solving Situation Generalization Measure and Recording Form

**Phase:** ____________  **Date:** __________________
**Observer:** __________  **Researcher:** __________  **Participant:** ______

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Participant Response</th>
<th>Grade (+/-)</th>
</tr>
</thead>
</table>
| (Situation 1) Missing papers/dustpan | 1. What is the problem?  
2. How can you fix the problem?  
3. What should you do if you cannot fix the problem? |                       |             |
| (Situation 2) Broken chair  | 1. What is the problem?  
2. How can you fix the problem?  
3. What should you do if you cannot fix the problem? |                       |             |
| (Situation 3) Mismatched utensils | 1. What is the problem?  
2. How can you fix the problem?  
3. What should you do if you cannot fix the problem? |                       |             |
| (Situation 4) Complete filing tasks | 1. What is the problem?  
2. How can you fix the problem?  
3. What should you do if you cannot fix the problem? |                       |             |
| (Situation 5) Incomplete/ Partially Complete cleaning tasks | 1. What is the problem?  
2. How can you fix the problem?  
3. What should you do if you cannot fix the problem? |                       |             |
## Appendix I. Sample Problem-Solving Assessment Situations (Used for Reliability of Measurement)

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missing 1. In the process of working, staples run out, and Faith needs to fill new ones into the stapler, but she cannot find any on her desk (missing staples).</td>
<td>1. What is the problem?</td>
<td>• Stapler is out of staples. • Stapler ran out of staples.</td>
</tr>
<tr>
<td></td>
<td>2. How can you fix the problem?</td>
<td>• Find staples and replace them in the stapler. • Look for staples in the drawer. • Put new staples in the stapler. • Find more staples.</td>
</tr>
<tr>
<td></td>
<td>3. What should you do if you cannot fix the problem?</td>
<td>• Ask someone for help • Ask someone for staples • Use a different staple • Ask if there is another stapler</td>
</tr>
<tr>
<td>Broken 2. Joyce starts to vacuum the floor when she learns that the vacuum cannot start (Broken Vacuum).</td>
<td>1. What is the problem?</td>
<td>• Vacuum won’t work • Vacuum broken • Vacuum won’t start</td>
</tr>
<tr>
<td></td>
<td>2. How can you fix the problem?</td>
<td>• Vacuum won’t turn on • Check to see if vacuum is plugged in • Try plug in/out • Try to figure out why it won’t start (Not plugged/jammed) • Plug vacuum in/try again</td>
</tr>
<tr>
<td></td>
<td>3. What should you do if you cannot fix the problem?</td>
<td>• Ask someone for help • Ask for help • Ask someone to look at the vacuum</td>
</tr>
</tbody>
</table>
Appendix I Continued

Sample Problem-Solving Assessment Situations (Used for Reliability of Measurement)

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Response</th>
<th>Grade (+/-)</th>
</tr>
</thead>
</table>
| Mismatched        | 3. Joan has been asked to place some black pepper on a table when she realizes that the container she has chosen while labelled pepper, has salt in it. | 1. What is the problem?  
• The shakers are not labelled correctly.  
• The container has wrong stuff in it.  
• Salt in pepper shaker.  
• Container has salt instead of pepper in the shaker.  
2. How can you fix the problem?  
• Replace container with correct one.  
• Switch the salt/pepper to proper shaker.  
• Check the container labelled salt to see if it has pepper.  
• Switch the label salt to pepper.  
3. What should you do if you cannot fix the problem?  
• Ask for help.  
• Ask someone if they know where to find the pepper.  
• Ask job coach for newer ones. | Grade (+/-) |
| Complete          | 4. Daniel has been asked to refill the bathroom with toilet paper, soap, and paper towels. However, he finds the bathroom has all the necessary supplies. | 1. What is the problem?  
• They were already stocked.  
• What is asked has already been done.  
• Supplies is already in the bathroom.  
• The bathroom does not need supplies.  
2. How can you fix the problem?  
• Double check the supplies/everything is in order.  
• Nothing to be fixed/No problem.  
• Put supplies away/don’t refill it.  
3. What should you do if you cannot fix the problem?  
• Tell someone that the task is complete.  
• Nothing to be fixed. Do something else.  
• No problem. Ask for a different task/job. |
### Appendix I Continued

Sample Problem-Solving Assessment Situations (Used for Reliability of Measurement)

<table>
<thead>
<tr>
<th>Problem situation</th>
<th>Questions</th>
<th>Response</th>
<th>Grade (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incomplete/Partially Complete</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 5. Peter has been asked to sort the letters into two piles, one pile for Canevin Hall and one pile for Fisher Hall. However, Peter notices the piles have already been started with 3 letters in each pile. | 1. What is the problem? | • Task is already started  
• Pile of letters have already been started | |
| | 2. How can you fix the problem? | • Start the task where it is  
• Continue sorting the letters into the previously started piles | |
| | 3. What should you do if you cannot fix the problem? | • Ask for clarification  
• Ask for help if needed  
• Ask someone for help | |
Appendix J. Measures of Social Validity

**a. Participant questionnaire**
- I enjoyed learning about problem-solving online on a computer or using my phone.
  - Agree – Disagree – Neutral
- I learned about what a problem is by watching the video
  - Agree – Disagree – Neutral
- I learned how to solve problems after watching the videos
  - Agree – Disagree – Neutral
- I enjoyed watching the video models to solve work problems
  - Agree – Disagree – Neutral
- I would like to watch video models to learn something new
  - Agree – Disagree – Neutral
- I think other people would learn by watching video models
  - Agree – Disagree – Neutral

**b. Observer questionnaire**
- The strategies implemented in this study were fairly easy to implement
  - Agree – Disagree – Neutral
- I believe that problem-solving skills are important to teach to my students
  - Agree – Disagree – Neutral
- I am likely to use the strategies used in this study in teaching problem-solving skills to my students in the future
  - Agree – Disagree – Neutral
- Video modeling was effective in teaching students to problem solve in a virtual learning environment/platform
  - Agree – Disagree – Neutral
- The intervention was feasible in the amount of time required to teach it
  - Agree – Disagree – Neutral
- The intervention (video modeling) was appropriate for the student's ability levels
  - Agree – Disagree – Neutral
- I feel comfortable teaching problem-solving skills using video modeling in a virtual learning environment/platform
  - Agree – Disagree – Neutral
- I will continue to use the strategies to teach my students post-study
  - Agree – Disagree – Neutral
Appendix K. Observer Training Protocols

Training of Observers (Teachers, Job Coaches, or Parents)

a. Who will train the observers?
   • The researcher will train the observers in this study.

b. Duration?
   • The training will last 30 minutes for five days (online platform in a group format).

c. What will observers learn?
   • Technology use
     o The researcher will teach the observers how to access and use the technology in this study (i.e., Nearpod and zoom). Access will include a demonstration of how to log into both apps using their emails, join a Nearpod lesson using the code the researcher will provide for both student-paced and teacher-paced lessons, and how the Nearpod application works for live formative and continuing assessments.
     o The observers will also watch a sample video assessment on Nearpod and learn how to respond to open-ended questions relating to problem-solving either by typing using the keyboard or by using the dictation feature on the screen that will record the audio then transcribe it before clicking the blue submit button.
     o Virtual learning environment etiquette.
   • Independent and dependent variables
     o The researcher will directly teach and demonstrate this study's independent variable (video modeling intervention) and dependent variable (i.e., problem-solving skills including problem identification, problem solution, and what to do when they cannot solve a problem on their own) to the observers.
     o The researcher will teach the observers about the appropriate problem-solving behavior they should observe by showing them a sample of standardized problem-solving skills measures responses and teaching them about examples and non-examples of the dependent variables.
   • Scoring and calculating interobserver agreement (IOA)
     o The researcher will then show the observers a sample of a downloaded report and explain how the Nearpod App will automatically submit the participant's responses once they submit their responses.
     o The researcher will then involve one of the observers as a volunteer to help calculate the IOA for each one of the hypothetical participant responses.
     o They will fill a form with answers they agree (+) or disagree (-) about as accurate before awarding the participant the correct performance scores to record in an excel sheet.
       ▪ The researcher will calculate the IOA by dividing the total number of agreements by agreements plus disagreements, multiplied by 100 (Ledford et al., 2018).
       ▪ In case of a total disagreement about the correct response, the researcher will reconcile with the observer to determine an acceptable participant response.
Appendix L. Observer Training Checklist

<table>
<thead>
<tr>
<th>Observer training checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Introduce the research, its purpose, and learning objectives for the training.</td>
</tr>
<tr>
<td>☐ Provide an agenda for the topics to be presented and times before the training commences.</td>
</tr>
<tr>
<td>☐ Teach observers how to access and use technology (Nearpod + Zoom).</td>
</tr>
<tr>
<td>☐ How to log into the virtual learning platform.</td>
</tr>
<tr>
<td>☐ How to play a video during the student-controlled lesson.</td>
</tr>
<tr>
<td>☐ How to respond by typing on keyboard or speaking into an onscreen microphone.</td>
</tr>
<tr>
<td>☐ Clicking the blue submit button.</td>
</tr>
<tr>
<td>☐ Virtual learning environment etiquette.</td>
</tr>
<tr>
<td>☐ Teach and demonstrate independent and dependent variables.</td>
</tr>
<tr>
<td>☐ Independent variable demonstration.</td>
</tr>
<tr>
<td>☐ Dependent variable demonstration.</td>
</tr>
<tr>
<td>☐ Step by step procedure for administering the intervention.</td>
</tr>
<tr>
<td>☐ Pre-baseline.</td>
</tr>
<tr>
<td>☐ Baseline.</td>
</tr>
<tr>
<td>☐ Intervention (Do's and Don'ts).</td>
</tr>
<tr>
<td>☐ Maintenance.</td>
</tr>
<tr>
<td>☐ Generalization.</td>
</tr>
<tr>
<td>☐ Teach scoring of IOA by evaluating a sample of downloaded Nearpod report and how to solve disagreements.</td>
</tr>
<tr>
<td>☐ Check for understanding.</td>
</tr>
</tbody>
</table>
Appendix M. Participant Training Protocols

Training of Participants

1. Who will train the participants?
   a. The observers will train the participants after the end of observer training. The researcher will be available to offer support.

2. Duration
   a. The training will last 30 minutes for five days and will be conducted in person or on an online platform, depending on participant availability. The training location will mimic the regular classroom environment and teacher/job coach/parent’s presence to minimize reactivity. This training will be individual or group training depending on individual participant strengths and needs.

3. Training protocol/Procedure for training
   a. The observers will train the participants to access and use technology in this study (i.e., Nearpod and Zoom) and zoom etiquette. Access will include direct teaching and demonstration of how to power a computer, log into both apps using given email credentials, and use a unique code to join a Nearpod lesson.

   b. The observers will also train the participants to type their responses using a keyboard or speak into an onscreen microphone to transcribe their speech responses before clicking the blue submit button to record their answers.

   c. For students who cannot log onto the apps independently, the observers will support them by making sure they log in. Observers will also help them remember to click on the blue submit button to record their answers.
Appendix N. Participant Training Checklist

Participant trainee protocol checklist

☐ Introduce the research, its purpose, and learning objectives for the training.
☐ Answer participant questions that may arise about the study.
☐ Teach about online learning environment etiquette.
☐ Teach observers how to access and use technology (Nearpod +Zoom)
  ☐ Power a device.
  ☐ Use credentials to log in.
  ☐ Play video (student-paced lesson) in the correct volume.
  ☐ How to mute and unmute.
  ☐ Type using the keyboard or speak into an onscreen microphone to record the response.
  ☐ Click the blue submit button.
Appendix O. Procedure for Implementing Study/Data Collection Procedure

**Pre-intervention**
- IRB approval and consent forms
- Record reviews, interviews, questionnaires, and receiving of consent forms.
- Observer training.
- Participant training.

**Baseline**
The baseline phase will begin (after fulfilling all the pre-intervention procedures) with the participant logging onto the virtual learning platform. The observer will then say to the participant, "you will watch a timed video clip that depicts different work situations on your screens. After watching the video clips, you will answer the questions that follow by typing on the keyboard or speaking into the onscreen microphone, then clicking the blue submit button to record your response". "You will not get any feedback or be allowed to ask any questions except about using the technology once the video starts to play on your device." Do you have any questions before we start?
- The teacher/observer will be in charge – this will help mimic everyday learning situations and minimize participant reactivity. The researcher will supervise and control the study remotely as an administrator in the virtual learning platform.
- The researcher will then give a baseline problem-solving skill video assessment measure to establish baselines for each participant.
  - Baseline sessions will last approximately 20 minutes each day, with about 5, 8, 13, 19, and 22 sessions per participant.
  - Observations only. No feedback or reinforcement.
  - Thank participants for their participation in the session.
  - The researcher will download the participant report and then meet with the assigned observer for about 20 minutes to determine each participant's scores and IOA.
  - The researcher will record the final score in an Excel sheet for analysis.

**Intervention**
The intervention phase will begin (in a staggered fashion following an observed stable baseline performance) with the participant logging onto the virtual learning platform. The teacher/observer will then say to the participant, "You will first watch a video clip that teaches you how to solve different work-related problems and what you should do if you cannot solve the problem independently. After watching the video clip, you will watch a new timed video clip with questions that you will answer by typing on the keyboard or speaking into the onscreen microphone, then clicking the blue submit button to record your response." "You will not get any feedback or be allowed to ask questions except about using the technology once the video starts playing on your device." Do you have any questions before we start?
- The teacher/observer will be in charge – this will help mimic everyday learning situations and minimize participant reactivity. The researcher will supervise and control the study remotely as an administrator in the virtual learning platform.
- The researcher will then play the video modeling clip followed by an intervention problem-solving skill video assessment measure to establish the levels of performance for each participant following the video modeling intervention.
  - Intervention sessions will last approximately 25 minutes each day, with about 24, 21, 16, 10, and 7 sessions per participant.
  - Observations only. No feedback or reinforcement.
  - Thank participants for their participation in the session.
  - The researcher will download the participant report and then meet with the assigned observer for about 20 minutes to determine each participant's scores and IOA.
  - The researcher will record the final score in an Excel sheet for analysis.
Maintenance
The maintenance phase will begin (one week following the withdrawal of intervention for each participant) with the participant logging onto the virtual learning platform. The teacher/observer will then say to the participant, "you will watch a timed video clip that depicts different work situations on your screens. After watching the video clips, you will answer the questions that follow by typing on the keyboard or speaking into the onscreen microphone, then clicking the blue submit button to record your response". "You will not get any feedback or be allowed to ask any questions except about using the technology once the video starts to play on your device." Do you have any questions before we start?
• The teacher/observer will be in charge – this will help mimic everyday learning situations and minimize participant reactivity. The researcher will supervise and control the study remotely as an administrator in the virtual learning platform.
• The researcher will then give a maintenance problem-solving skill video assessment measure to establish a participant's maintenance level of problem-solving skill procedure performance following the withdrawal of video modeling intervention.
  □ Maintenance sessions will last approximately 20 minutes each day, with about two sessions per participant.
  □ Observations only. No feedback or reinforcement.
  □ Thank participants for their participation in the session.
  □ The researcher will download the participant report and then meet with the assigned observer for about 20 minutes to determine each participant's scores and IOA.
  □ The researcher will record the final score in an Excel sheet for analysis.

Generalization
The generalization phase will begin two weeks after the withdrawal of the video modeling intervention, with the observers (job coach/teacher) accompanying the participant to an on-campus job site where they will have contrived different job situations. The job coach will then inform the participant, "You will be required to accomplish a job task with different components (Some of the job task components may be missing, complete, mismatched, broken, or incomplete/partially complete). I will ask you three questions once you encounter a specific work problem. You will respond by answering the questions verbally for me to record your response. You will not get any feedback or be allowed to ask questions once you start working." Do you have any questions before we start?
• The job coach will be in charge of mimicking everyday work experience situations and minimizing participant reactivity. The researcher will observe and take notes from afar.
• The job coach will give the generalization problem-solving skill assessment measure by asking the scripted questions loudly to participants to establish their level of generalization of problem-solving skills following the video modeling intervention for each participant.
  □ Generalization probes will last approximately 20 minutes each day, with about one session per participant.
  □ Observations only. No feedback or reinforcement.
  □ Thank participants for their participation in the session.
  □ The researcher and job coach will both collect data on student responses simultaneously by recording it into a Problem-solving Situation Generalization Measure and Recording Form (see Appendix H)
  □ The researcher will meet with the job coach assigned as an observer for about 20 minutes to determine each participant's scores and IOA.
  □ The researcher will record the final score in an Excel sheet for analysis.
# Appendix P. Study Implementation Checklist

## Checklist for study implementation

### Baseline
- Participants logged into the classroom in time, and technology is working well.
- Correct video assessment clip played.
- The video assessment clip played in ample volume.
- Computer unmuted.
- The timer is set for 18 minutes and started after the observer finishes giving directions.
- Participants clicked the blue submit button after recording their responses.
- The observer uses the least to the most prompting system when necessary for participants to submit responses.
- No teaching or coaching takes place.
- The researcher downloads the assessment report after the session.
- Both researcher and job coach determine IOA after each study session (at least 30% of sessions).
- The researcher recorded the student performance in an Excel sheet for analysis.

### Intervention
- Participants logged into the classroom in time, and technology is working well.
- Correct video clip (video model and video assessment) played.
- The video clip played in ample volume.
- Computer unmuted.
- The timer is set for 24 minutes and starts after the observer finishes giving directions.
- Participants clicked the blue submit button after recording their responses.
- The observer uses the least to the most prompting system when necessary for participants to submit responses.
- The researcher downloads the assessment report after the session.
- Both researcher and job coach determine IOA after each study session (at least 50% of sessions).
- The researcher recorded the student performance in an Excel sheet for analysis.

### Maintenance
- Correct video assessment clip played.
- The video assessment clip played in ample volume.
- Computer unmuted.
- The timer is set for 18 minutes and started after the observer finishes giving directions.
- Participants clicked the blue submit button after recording their responses.
- The observer uses the least to the most prompting system when necessary for participants to submit responses.
- No teaching or coaching takes place.
- The researcher downloads the assessment report after the session.
- Both researcher and job coach determine IOA after each study session (100% of sessions).
- The researcher recorded the student performance in an Excel sheet for analysis.

### Generalization
- Correct work situations arranged, and correct scripts read.
- The timer is set for 18 minutes and started after the observer finishes giving directions.
- Participants responded to questions by verbalizing the answer.
- The observer uses the least to the most prompting system when necessary for the participant to verbalize their response.
- No teaching or coaching takes place.
- Teacher or job coach recorded participant responses in the correct forms in writing during generalization probes.
- The researcher recorded the student performance in an Excel sheet for analysis.