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Systematic Review of Instructional Methods to Teach Employment Skills to Secondary Students With Intellectual and Developmental Disabilities

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Abstract

Effective vocational instruction is an essential aspect of preparing students with intellectual and developmental disabilities (IDD) for the world of work. We systematically reviewed research on instructional methods used to teach employment skills to secondary students with IDD. We identified 56 studies involving 766 participants with IDD. Four intervention approaches emphasized technology or some other instructional stimulus (i.e., self-management devices, video-based, audio-based, picture and tactile-based) and four focused on live instructors (i.e., direct instruction, augmentative and alternative communication, simulation, peer-delivered). Among the 21 instructional methods used within these approaches, performance feedback, device-assisted instruction, response prompting, and community-based instruction were the most common. We address the extent to which these intervention approaches were effective across students, instructional methods, settings, and outcomes, as well as offer recommendations for future research and practice.

Keywords

employment, intellectual disability, autism, transition, vocational instruction

Promoting pathways to competitive employment has shifted to the forefront of policy, research, and advocacy efforts. As articulated in the TASH National Agenda (2016), integrated employment "is an essential component of life in the community, and leads to greater independence and opportunity for people with disabilities." Although many young adults with intellectual and developmental disabilities (IDD) desire to enter the competitive workforce, the opportunities available to them after high school are often limited (Butterworth et al., 2012). For young people with severe disabilities, the postschool employment pathways are especially disconcerting (Carter, Austin, & Trainor, 2012). Approximately one in four young adults with intellectual disability (23.8%) and one in three young adults with autism (32.3%) or multiple disabilities (37.5%) have never held paid employment within 8 years after exiting high school (Newman et al., 2011).

Among the primary obstacles to obtaining integrated employment for young adults with IDD is the absence of strong employment skills instruction in secondary schools. Schools provide an opportune time to deliver employment-related instruction for a number of reasons. First, the Individuals With Disabilities Education Act (IDEA; 2004) mandates secondary schools prepare students for future work through

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transition assessment, planning, and employment-related instruction. In many states, the Individualized Education Program (IEP) team must begin the transition process at age 14 and provide career development programming until students exit school at or before age 22. States are required to report annually the employment rates for former students (Indicator 14, IDEA, 2004). Second, employment skills instruction is an integral component of high-quality transition education that contributes to postsecondary employment success (Mazzotti et al., 2016). This critical link is reflected in the emphasis of career preparation and work-based learning experiences in every transition framework (e.g., Kohler, 1996; Test, Smith, & Carter, 2014). For example, the National Collaborative on Workforce and Disability for Youth (2015) advises students receive multiple opportunities to learn and practice employment skills at school and on the job.

With the importance of employment-related instruction firmly established, the enduring question is how to deliver this instruction effectively in schools. Several literature reviews have addressed this topic. Park, Kim, and Kim (2016) presented a meta-analysis of seven randomized controlled trials evaluating job-related social skills training for students with a range of disabilities (e.g., autism, intellectual disability, learning disabilities) and found the largest effect in studies with school-based direct instruction. Cannella-Malone and Schaefer (2015) conducted a systematic review of vocational skill instruction for individuals with severe disabilities of all ages. Their search yielded 62 studies; yet only 13% involved school-based interventions and only 30% of all participants were transition-age (14-22 years old). Bennett and Dukes (2013) identified 12 studies on teaching employment skills to secondary students with autism. To date, no systematic review has focused specifically on intervention approaches and instructional methods to teach employment skills to secondary students with IDD.

Further research is needed to understand *how* to teach employment skills to students with IDD during the pivotal transition years. Specifically, a comprehensive review is needed to address the (a) intervention approaches found to be effective for teaching employment skills to secondary students with IDD; (b) instructional methods comprising these intervention approaches; (c) characteristics of the students, instructors, and settings involved in these studies; and (d) quality of extant research against a rigorous set of indicators. The purpose of the present review is to map the literature on interventions used to teach employment skills to secondary students with IDD. Our questions are as follows:

Research Question 1: Which intervention approaches to teach employment skills to secondary students with IDD have been experimentally evaluated?
Research Question 2: What instructional methods are used within these intervention approaches?
Research Question 3: What are the characteristics of the students, instructors, and settings within these studies?
Research Question 4: To what extent do studies meet methodological quality indicators?
Research Question 5: What is the efficacy, generalizability, and social validity of these interventions?

Method

Inclusion Criteria

We selected studies for review based on the following criteria. First, they must have tested the efficacy of an intervention using either a single-case design (with a minimum of three opportunities for demonstration) or a group design (with at least one control or comparison group). Second, at least half of study participants (a) had a diagnosis or special education classification of autism (i.e., autism, Asperger syndrome, Pervasive Developmental Disorder–Not Otherwise Specified [PDD-NOS]) or intellectual disability, (b) were between the ages of 14 and 22 years old, and (c) were enrolled in a public secondary school or transition program. Participants in private schools and postsecondary education programs were excluded. Third, studies must have evaluated an intervention to teach employment skills. Studies met this criterion if at least one intervention condition (a) involved data collection in an employment setting (i.e., students' place of paid employment, a paid or unpaid internship site, a community-based classroom, sheltered workshop) or (b) taught a skill intended for use in an employment setting, as explicitly stated by the authors. Fourth, the dependent

variable had to address at least one employment skill. That is, the researchers must have measured a targeted task or behavior in or intended for an employment setting. Fifth, all studies were published in English in a peer-reviewed journal before December 2015.

Search Procedures and Screening

We employed a comprehensive approach to identify all studies meeting our criteria. We performed an electronic search of PsycINFO, Education Full Text (EBSCO), and ERIC databases, including keywords to generate results targeted to participants' disability labels (e.g., autism, intellectual disability, mental retardation, cognitive impairment), school enrollment (e.g., high school, adolescents, students), employment focus (e.g., vocation, job, work), and study design (e.g., single-case group design).

The initial search produced 5,406 unique results across the three databases. The first round of screening involved reading the title and abstract to eliminate nonexperimental studies and studies with more than half of participants identified as being out of the targeted age range or disability categories. Studies with abstracts too vague to allow for elimination received a full text review in the next round. During the second round of screening, we read the full text of studies retained from the first round ($n = 327$) to identify studies meeting all inclusion criteria. We also examined the bibliographies and located studies citing each of the articles identified as meeting inclusion criteria (i.e., ancestral and forward searches).

An advanced doctoral student in special education served as a second rater for 20% of the studies in each round of screening. We calculated interrater reliability by taking the number of agreements divided by the number of agreements plus disagreements, multiplied by 100%. During the first round, the second rater reviewed 1,082 citations, and interrater reliability was 99.2%. During the second round, the second rater reviewed the full text of 67 articles, and reliability was 97.0%.

Coding of Studies

We coded each study related to participant characteristics, intervention characteristics, and methodological and design characteristics. When information was not reported in the article, we coded it as unknown. As studies could include both participants who did and did not meet inclusion criteria, we coded student characteristics only for the subset of participants meeting criteria for this review. *Participant characteristics* included age, gender, race/ethnicity, and disability diagnosis (i.e., autism only, intellectual disability only, or both). We coded the severity of cognitive impairment associated with participants' disability (e.g., mild, moderate, severe, profound, other, no cognitive impairment, or not reported). If authors did not report a severity label, we coded IQ scores as mild (50-70), moderate (35-49), severe (20-34), or profound (<20) (Emerson, Hatton, Dickson, Gone, & Caine, 2012). We indicated "other" if authors reported cognitive impairment in another way (e.g., mental age). We coded the number of participants enrolled by school type (i.e., middle school, high school, community-based transition program affiliated with a high school, specialized school for students with disabilities).

We characterized each *intervention approach* based on how instruction was delivered. The eight intervention approaches were as follows: (a) self-management instruction, (b) video-based instruction, (c) audio-based instruction, (d) picture and tactile-based instruction, (e) direct instruction, (f) augmentative and alternative communication (AAC)–assisted instruction, (g) simulation instruction, and (h) peer-delivered instruction. Although some studies incorporated multiple intervention approaches, we categorized studies based on the way authors presented their primary instructional focus. Table 1 defines the *instructional methods* reported to teach employment skills. We identified these methods by adapting definitions from the National Technical Assistance Center on Transition's (NTACT; 2016) review of 15 effective instructional practices. If authors reported methods outside of this list, we coded them as "other" and created a name and description based on the methods used to teach employment skills across studies.

We coded information about who served as the *instructor* (e.g., external researcher, teacher, paraprofessional, job coach) and the length and format of instructor training (if applicable). We indicated whether the study reported a measure of *procedural fidelity* of instruction delivery and described reporting method, frequency, and overall results of their fidelity measures. We also coded the *primary features* of the

Table 1. Instructional Methods Across Studies.

Method	Definition	*n*	%
Performance feedback	Includes verbal supportive and corrective feedback during instruction and/or coaching (e.g., praise, reinforcement)	36	64.3
Device-assisted instruction[a]	Including a computer, other technological device (e.g., tablet, iPhone, digital watch), or a form of AAC such as a communication board or a picture book	34	60.7
Response prompting[a]	Using stimuli that later function as extra cues/reminders for desired behavior; can be visual, auditory, tactile, or symbolic	33	58.9
Community-based instruction[a]	Teaching or expanding employment skills in the community or job setting where they would naturally occur	32	55.4
Task chaining[a]	Training on each step of a task analysis	30	53.6
Live modeling	Instructor performs the desired behavior live in the exact way intended for the participant to imitate	29	51.8
Self-management strategies[a]	Strategies to manage and direct one's own behavior in settings where other controls are not present or feasible	23	41.1
Physical guidance	A form of response prompting in which the instructor provides hand-over-hand or gestural assistance	19	33.9
Least-to-most prompting[a]	Providing the participant with the opportunity to perform the response with the least amount of assistance and subsequently providing greater degree of assistance as needed	16	28.6
Simulations[a]	Using materials and situations in the teaching environment that approximate the natural stimulus conditions and response topographies of functional skills in community settings (e.g., role-playing)	14	25.0
Video modeling[a]	Participants watch a video of someone performing a desired behavior to eventually imitate the behavior of the model in the video	11	19.6
Constant time delay[a]	Presenting the target stimulus simultaneously with a controlling prompt, followed by an opportunity to respond for a specified number of trials, with the interval lasting for a fixed number of seconds	7	12.5
Simultaneous prompting[a]	Providing a prompt at the same time as the target stimulus, presenting an opportunity to respond, and reinforcing correct responses	6	10.7
Covert audio coaching	Providing performance feedback where the instructor has the radio transmitter and the participant has a radio receiver with an attached earpiece (i.e., audio cuing)	4	7.1
Mnemonics[a]	Using keywords or icons that provide acoustic reconstructions of unfamiliar information such as symbolic pictures of abstract concepts or descriptive pictures of concrete information	4	7.1
Backward chaining[a]	Breaking down steps of a task and teach them in reverse order, wherein all behaviors identified in the task analysis are initially completed by the trainer except for the final behavior in the sequence	3	5.4
Most-to-least prompting[a]	Physically guiding the participant through the performance sequence, then gradually reducing the amount of physical assistance provided as training progresses from session to session	2	3.6
Peer-assisted strategy[a]	Delivering instruction with help from peers (e.g., peer tutoring, cooperative learning with groups of students, or peer support groups)	2	3.6
Progressive time delay[a]	Gradually increasing the amount of time between the natural cue to perform the task and providing assistance to the participant	2	3.6
Choice-making	Offering the option to complete tasks in a preferred order	1	1.8
Reinforcement contingency	Providing participants access to preferred items when target behavior occurred or rate criterion was achieved	1	1.8

Note. Overall percentages exceed 100% because studies could be coded with more than one instructional method. *n* = number of studies including this instructional method.

[a]Method adapted from the National Technical Assistance Center on Transition (2016) list of effective transition practices.

intervention, including the name and description given by authors, dosage (i.e., frequency and length), format (i.e., one-to-one, partners, small group of <5 participants, large group of >5 participants), whether or not the participants received pretraining on a technological device or skill prior to baseline, and a description of the performance criteria (if given/applicable) to terminate the intervention phase. We recorded any of the following *intervention settings* that applied for each study: (a) integrated workplace, (b) segregated workplace, (c) school, or (d) other.

We coded three types of information about the *employment outcomes*: (a) the measures used to evaluate the efficacy of the intervention (e.g., task analysis, rate of target behavior), (b) the types of employment-related tasks students were performing during data collection phases (e.g., clerical, assembly), and (c) whether any aspect of the measurement addressed social-related skills (i.e., any interactions with another person during task completion). Examples of social-related steps included asking for help from a supervisor or communicating with coworkers.

We coded studies in relation to *methodological quality indicators* using an adaptation of Council for Exceptional Children Standards for Evidence-Based Practices (Council on Exceptional Children [CEC], 2014). Table 2 presents quality indicators in eight areas: (a) context and setting, (b) participants, (c) intervention agents, (d) procedures, (e) implementation fidelity, (f) internal validity, (g) dependent variables, and (h) data analysis. We recorded information about reported effects using effect size for group studies and visual analysis for single-case studies. For single-case design studies, we classified the intervention as having a strong positive effect on the dependent variable if (a) a meaningful, therapeutic change was seen in at least three cases; (b) there were zero cases of no change or a contra-therapeutic change; and (c) no more than one fourth (25%) of cases showed a weak effect. Weak effects were changes tempered because of level, variability, overlap, trend, or unexpected delay in immediacy of effect. We classified a positive effect on the dependent variable if the above criteria for a strong positive effect were not met, but (a) there was still a meaningful, therapeutic change in at least three cases; and (b) at least three fourths (75%) of cases showed a positive, therapeutic change. We classified the intervention as having no effect or negative effects on the dependent variable if (a) there was no change in 50% or more of demonstrations or (b) there were counter-therapeutic effects in any demonstration. We classified a neutral or mixed effect on the dependent variable if criteria for none of the other three categories were met. For example, a study demonstrating effects in two of three cases (with the other case showing no change between phases) was classified as having neutral or mixed effects. We coded measurement of *generalization* indicating the type of generalization (e.g., applied to new setting or skill) and when it was measured (i.e., posttest only, pre- and posttest, repeated measurement within single-case design). We coded *maintenance* by indicating the time that had passed since the end of the intervention and the number of data points assessing maintenance in each tier. We classified maintenance and generalization effects using three categories: no effect (i.e., data at or near baseline in one-half or more of measured cases), positive effects (i.e., data similar to intervention condition or at criterion in three or more cases and at least three fourths of cases), and mixed effects (i.e., did not meet criteria for either of the other categories). Finally, we coded whether and how authors reported *social validity* of the intervention's goals, outcomes, and procedures.

Reliability

We calculated interrater reliability for 11 randomly selected studies (19.6%) by using data from two independent coders (i.e., number of exact agreements, divided by agreements plus disagreements). Interrater reliability at the study level averaged 95.1% (range = 91.5%-98.0%). Reliability at the variable level averaged 89.2% (range = 64.0%-100%). Three variables yielded patterns of agreement below 80% (i.e., reporting of gender, intervention frequency, and positive effect). We discussed disagreements and used consensus data in final analyses.

Results

We included 56 studies in this review, published across 23 journals between 1983 and 2015. Sixteen studies (28.6%) were published prior to 1990, 14 studies (25.0%) were published between 1990 and

Table 2. Summary of Quality Indicators Across Studies.

CEC quality indicator	Definition	*n*	%
Setting (1.1)	Specific location and number of participants	53	94.6
Participant demographics (2.1)	Gender, age and/or grade, and race/ethnicity	7	12.5
Participant disability (2.2)	Participant disability label and method of determining label	45	80.3
Intervention agent (3.1, 3.2)	Description of who delivered the intervention and their training	46	82.1
Intervention procedures (4.1)	Description of dosage, frequency, and length of sessions	21	37.5
Intervention materials (4.2)	Description of materials for the intervention	55	98.2
Measurement fidelity (5.1, 5.2)	Measures and reports implementation fidelity related to adherence and dosage	26	46.4
Fidelity breadth (5.3)	Provides evidence of assessing fidelity of intervention components regularly (>20%) for each instructor, setting, participant, or other unit	26	46.4
Systematic intervention (6.1)	Researcher controls and systematically manipulates the independent variable	54	96.4
Baseline description (6.2)	Description of baseline phase or comparison condition (e.g., setting, personnel, activities)	53	94.6
Baseline access (6.3)	Description confirms baseline phase or control group participants have no or limited access to the intervention materials and components	50	89.2
Experimental demonstrations (6.4, 6.5)[a]	Design provides opportunity for at least three demonstrations of experimental effects in single-case studies (e.g., across three participants or different phases within a single participant)	51	96.2
Baseline length (6.6)[a]	All baseline phases include at least three data points	47	88.7
Internal validity (6.7)[a]	Controls for common threats to internal validity (e.g., ambiguous temporal precedence, history, maturation) through proper design and execution of design so alternative explanations can be ruled out	48	85.7
Design attrition (6.8)[b]	Overall attrition is low across groups (e.g., <30% in a 1-year study)	0	0.0
Differential attrition (6.9)[b]	Differential attrition between groups is low (e.g., <10%) or is controlled for by adjusting for noncompleters	0	0.0
Socially important outcome (7.1)	Desired outcome is socially important (e.g., explicitly linked toward employment) as verified by authors, stakeholders, or participants	56	100.0
Dependent variable (7.2)	Target outcome is (a) defined in measurable terms, (b) authors sufficiently describe measurement to ensure it was measured with quantifiable precision, and (c) outcome is measured repeatedly across phases	56	100.0
Reported effects (7.3)	Authors clearly report data of all participants/phases for all identified outcomes, not just those with positive effects (e.g., *p* levels or effect sizes, graphed data, or clear description)	55	98.2
Outcome measurement timing (7.4)	Frequency and timing of outcome measures are appropriate. For single-case studies, a minimum of three data points per phase is considered a demonstration of effect (excluding generalization or maintenance)	53	96.5
Reliability (7.5)	Reliability of data collection is measured (a) with an independent observer in at least 20% of sessions, (b) with method described, (c) reported, and (d) met minimal standards (i.e., average IOA > 80%; Kappa > 60%)	46	82.1
Group analysis (8.1)[b]	Data analysis techniques are appropriate to analyze change in performance for two or more groups	3	100.0
Visual analysis (8.2)[a]	Study provides single-case graph that represents outcome data across study phases for each unit of analysis that allows for visual analysis (i.e., analysis of mean, level, trend, overlap, consistency of data patterns)	52	92.9
Group effect size (8.3)[b]	Study reports one or more appropriate effect size statistics (e.g., Cohen's *d*, Hedges's *g*, Glass's delta) for target outcomes, even if not statistically significant (or provides data from which effect sizes can be calculated)	81	45.3
Single-case effect size (8.3)[a]	The study includes a measure of effect size, including effect size score or PND	5	8.9

Note. Percentages reflect the proportion of studies that met criteria out of the proportion of eligible studies (*n* = 56 for all studies, *n* = 53 for single-case only, *n* = 3 for group design only). *n* = number of studies satisfying this CEC (2014) quality indicator; CEC = Council for Exceptional Children; PND = percentage of nonoverlapping data; IOA = interobserver agreement.
[a]This indicator was evaluated for single-case design studies only. [b]This indicator was evaluated for group-design studies only.

Table 3. Summary of Studies by Dependent Measure, Setting, Intervention, and Participants.

Study	Dependent measure (setting)	Intervention	Participants
Self-management instruction (*n* = 12)			
Agran, Fodor-Davis, Moore, and Deer (1989)	Number of trials students emitted prompts in janitorial tasks (S)	Self-management training	1 F ID, 4 M ID (*M* = 15)
Alberto, Sharpton, and Briggs (1986)	Percentage of steps correct on pipe assembly task analysis (S)	Self-operated auditory prompting	2 F ID, 1 M ID (*M* = 15)
Alberto, Taber, and Fredrick (1999)	Number of aberrant behaviors (C)	Self-operated auditory prompting	1 F ID, 1 M ID (*M* = 19)
Cihak, Kessler, and Alberto (2007)	Number of independent task transitions in restaurant (W)	Handheld prompting device	1 F ID, 3 M ID (*M* = 19)
Cihak, Kessler, and Alberto (2008)	Number of independent task transitions in restaurant (W)	Handheld prompting device	1 F ID, 3 M ID (*M* = 17)
Davis, Brady, Williams, and Burta (1992)	Rate of performance fluency on restaurant bussing tasks (W)	Self-operated auditory prompting	2 F ID, 1 M ID (*M* = 17)
Hughes, Alberto, and Fredrick (2006)	Occurrence of off-task behavior (W)	Self-operated auditory prompting	2 F ID, 2 M ID (*M* = 17)
Mank and Horner (1987)	Rate of productivity; accuracy of responses in restaurant (W)	Self-monitoring and feedback	1 F ID, 5 M ID (*M* = 19)
McGlashing-Johnson, Agran, Sitlington, Cavin, and Wehmeyer (2003)	Percentage of steps correct on transition task analysis (W)	Goal attainment model	2 F ID, 2 M ID (*M* = 18)
Mitchell, Schuster, Collins, and Gassaway (2000)	Percentage of steps on task analysis of cleaning a bathroom (S)	Self-operated auditory prompting	2 F ID, 1 M ID (*M* = 15)
Riffel et al. (2005)	Duration and steps correct in restaurant task analysis (S, W)	Visual assistant system	1 F ID, 1 M ID (*M* = 18)
Taber, Alberto, and Fredrick (1998)	Independent movement through chain of cleaning tasks (W)	Self-operated auditory prompting	1 F ID, 4 M ID (*M* = 17)
Video-based instruction (*n* = 12)			
Allen, Wallace, Renes, Bowen, and Burke (2010)	Number of interactions with customers (W)	Video modeling	3 M A (*M* = 17)
Bennett, Gutierrez, and Honsberger (2013)	Percentage of steps correct on clerical task analysis (S)	Video prompting and narration	4 M A (*M* = 16)
Bereznak, Ayres, Mechling, and Alexander (2012)	Percentage of steps correct on clerical task analysis (S)	Video prompting	3 M ID/A (*M* = 16)
Cannella-Malone et al. (2015)	Percentage of steps correct on cleaning task analysis (S)	Video/self-prompting	1 F ID/A (*M* = 16)
Cihak and Schrader (2008)	Percentage of steps correct on assembly task analysis (S)	Video/self-modeling	3 M ID/A (*M* = 19)
Malouf, MacArthur, and Radin (1986)	Posttest score evaluating on-the-job social skills (S)	Videotape-based instruction	48 ID (*M* = unknown)
Mechling and Ortega-Hurndon (2007)	Percentage of steps correct on clerical task analysis (W)	Computer-based video instruction	1 F ID, 2 M ID (*M* = 20)
Smith et al. (2015)	Initiation of self-instruction of clerical tasks (S)	Progressive time delay	4 M ID/A (*M* = 17)
Taber-Doughty, Miller, Shurr, and Wiles (2013)	Percentage of steps correct on clerical task analysis (S)	Video modeling	2 M ID/A, 2 F ID (*M* = 17)
Van Laarhoven, Van-Laarhoven-Myers, and Zurita (2007)	Percentage of steps correct on restaurant task analysis (W)	Video modeling	1 M ID, 1 M A (*M* = 18)
Van Laarhoven, Johnson, Van Laarhoven-Myers, Grider, and Grider (2009)	Percentage of steps correct on cleaning task analysis (W)	Video prompting	1 M ID (*M* = 17)
Van Laarhoven, Kos, Pehlke, Johnson, and Burgin (2014)	Percentage of steps correct on social task analysis (S)	Video modeling and feedback	2 F ID/A 1 F ID, 1 M ID (*M* = 17)

(continued)

Table 3. (continued)

Study	Dependent measure (setting)	Intervention	Participants
Audio-based instruction (*n* = 3)			
Allen, Burke, Howard, Wallace, and Bowen (2012)	Number of social interactions with customers (W)	Audio cuing	1 F ID/A, 2 M ID/A (*M* = 17)
Bennett, Ramasamy, and Honsberger (2013b)	Percentage of steps correct on retail task analysis (S, W)	Covert audio coaching	1 F A, 2 M A (*M* = 17)
Bennett, Ramasamy, and Honsberger (2013a)	Percentage of steps correct on clerical task analysis (S)	Covert audio coaching	3 M A (*M* = 17)
Picture and tactile-based instruction (*n* = 7)			
Berg and Wacker (1989)	Percentage of steps correct on clerical task analysis (S)	Tactile cues	1 F ID (*M* = 19)
Carson, Gast, and Ayres (2008)	Number of independent transitions of restaurant tasks (S, W)	Photo activity schedule book	1 F, 2 M ID (*M* = 19)
Fisher (1984)	Completion of an instruction sequence of assembling a truck (S)	Exploded view drawings	236 F ID, 301 M ID (*R* = 15-21)
Sowers, Verdi, Bourbeau, and Sheehan (1985)	Number of independent cleaning task transitions (W)	Picture-cue training	4 M ID (*R* = 18-21)
Wacker and Berg (1983)	Percentage of steps correct on assembly task analysis (S)	Picture prompts	3 F ID, 2 M ID (*M* = 19)
Wacker and Berg (1984a)	Placement of pieces in assembly tray (U)	Picture prompts	2 F ID, 1 M ID (*M* = 19)
Wacker, Berg, Berrie, and Swatta (1985)	Percentage of steps correct on cleaning task analysis (S)	Picture prompts	1 F ID, 2 M ID (*R* = 13-19)
Direct instruction (*n* = 11)			
Alper (1985)	Percentage of steps correct on card sorting task analysis (S)	Hierarchical levels of questioning	2 F ID, 1 M ID (*M* = 18)
Chandler, Schuster, and Stevens (1993)	Percentage of steps correct on clerical task analysis (S)	Total task presentation	2 F ID, 2 M ID (*M* = 17)
Egan, Fredericks, and Hendrickson (1985)	Occurrence of inappropriate behaviors (S, W)	Behavioral reinforcement	5 ID (*M* = 16)
Fetko, Schuster, Harley, and Collins (1999)	Percentage of steps correct on task analysis of opening locker (S)	Simultaneous prompting	3 F ID, 1 M ID (*M* = 18)
Gaylord-Ross, Forte, Storey, Gaylord-Ross, and Jameson (1987)	Percentage of steps correct on laboratory task analysis (W)	Cueing procedures	5 F ID, 2 M ID (*M* = 18)
Lee and Singer-Dudek (2012)	Rate of performance and work cessations of assembly tasks (S)	Fluency and accuracy training	1 M ID, 1 M ID/A (*M* = 18)
Rigsby-Eldredge and McLaughlin (1992)	Number of unprompted responses of appropriate behavior (S, W)	Modeling and praise	2 M A (*M* = 20)
Seybert, Dunlap, and Ferro (1996)	Occurrence of on-task behavior of assembly tasks (S)	Choice-making procedures	1 F ID, 2 M ID (*M* = 17)

(continued)

Table 3. (continued)

Study	Dependent measure (setting)	Intervention	Participants
Spewock (1990)	Number of assists and errors to criterion of assembly tasks (S)	Instructional cues	50 ID (*R* = 13-17)
Storey and Allardice (1987)	Percentage of steps correct on social task analysis (W)	Role-playing and prompting	3 F ID (*M* = 17)
Zetts, Horvat, and Langone (1995)	Increase in speed and strength of manual labor tasks (C)	Progressive resistance	2 F ID, 4 M ID (*M* = 17)
AAC-assisted instruction (*n* = 6)			
Allgood, Heller, Easterbrooks, and Fredrick (2009)	Number of communication initiations (W)	Picture dictionaries	3 F ID, 2 M ID (*M* = 18)
Heller, Ware, Allgood, and Castelle (1994)	Number of correct responses communicating with others (S, W)	Dual communication boards	4 ID (*M* = 19)
Heller, Allgood, Davis, et al. (1996)	Occurrence of requests using correct symbol (S, W)	Dual communication boards	3 ID (*M* = 20)
Heller, Allgood, Ware, Arnold, and Castelle (1996)	Number of correct responses communicating with others (S, W)	Dual communication boards	1 M ID (*M* = 20)
McGregor, Young, Gerak, Thomas, and Vogelsberg (1992)	Number of data entries matched using correct icons (S)	Task-referenced icons on AAC	1 F ID (*M* = 17)
Rodi and Hughes (2000)	Occurrence of appropriate communication symbols (W)	Milieu training	2 F ID, 1 M ID (*M* = 17)
Simulation instruction (*n* = 3)			
Cihak, Alberto, Kessler, and Taber (2004)	Percentage of steps correct on clerical task analysis (S, W)	Community-based instruction	5 M ID (*M* = 18)
DiPipi-Hoy, Jitendra, and Kern (2009)	Performance on checklist of cleaning maintenance tasks (S, W)	Time management instruction	4 M ID (*M* = 17)
Woolcock, Lyon, and Woolcock (1987)	Percentage of steps correct on cleaning task analysis (W)	General case simulation	1 F ID, 1 M ID (*M* = 20)
Peer-delivered instruction (*n* = 2)			
Agran, Fodor-Davis, Moore, and Martella (1992)	Percentage of steps correct on lunch sorting task analysis (W)	Peer-delivered training	1 F ID, 2 M ID (*M* = 14)
Wacker and Berg (1984b)	Percentage of steps correct on clerical tasks (W)	Peer instruction	3 F ID (*M* = 19)

Note. Only participants meeting study criteria are included in this table. Information reports number of participants, gender, and disability. S = school, F = female, ID = intellectual disability, M = male, *M* = mean age of included participants, C = community, W = workplace, A = autism, ID/A = both ID and autism, *R* = range of ages if mean not included, U = unclear, AAC = alternative and augmented communication.

1999, 15 studies (26.8%) were published between 2000 and 2009, and 11 studies (19.6%) were published in or after 2010. All studies were conducted in the United States. Table 3 summarizes descriptive information about each study.

Participant Characteristics

Across the 56 studies, 766 students participated. The majority ($n = 587$) were from three group-design studies involving large randomized controlled studies (i.e., Fisher, 1984; Malouf, MacArthur, & Radin, 1986; Spewock, 1990). In addition, 179 students from the 191 total participants in single-case studies met our inclusion criteria. Most studies (71.4%) described inclusion criteria used to select participants, which typically included the following: (a) having a diagnosis of IDD, (b) having IEP goals related to increased independence in the performance of daily living or employment skills, (c) being able to follow prompts and multistep verbal directions, (d) exhibiting deficits or delays in skills similar to those measured in the study, (e) needing assistance to complete employment tasks, and (f) having a community-based job placement and/or a personalized curriculum, including vocational instruction. When specified, most participants (62.3%) were male. The majority of participants (78.8%) had intellectual disability (ID) without autism, 11.7% had autism and ID, and 9.5% had autism without ID. Nearly half (45.3%) of all participants had moderate cognitive impairment, 21.8% had severe, 11.2% had mild, 2.8% had profound, and 1.1% had none; no information was reported for 17.3%. Most (81.6%) were public high school students, 7.3% were students at a high school for students with disabilities, and 2.8% were in junior high school. School level was not specified for 4.5% of participants. Participants ranged from 14 to 21 years old; almost half (48.1%) were 17 to 19.

Settings

Most studies (55.4%) were conducted in school settings ($n = 21$) or at a school setting with generalization probes in the workplace ($n = 10$). Seventeen studies (30.4%) occurred in an employment setting, and eight (14.3%) were coded as "other" (e.g., gym, city bus in transit to workplace). No studies occurred in segregated workplaces.

Intervention Approaches

Across studies, four general intervention approaches (i.e., self-management, video-based, audio-based, picture and tactile-based) emerged across 34 studies that incorporated technology or another instructional stimulus (e.g., picture cues). *Self-management instruction* involved participants acquiring new skills with the assistance of a self-initiated or self-managed system, such as an auditory prompting system ($n = 7$), handheld computers ($n = 3$), or self-monitoring checklist ($n = 2$). Twelve studies used *video-based instruction* as their primary intervention approach across six forms: video modeling alone ($n = 4$), video prompting and feedback ($n = 2$), video modeling combined with video prompting ($n = 1$), video prompting combined with video self-prompting ($n = 1$), video-based instruction with instructor support ($n = 1$), and comparison of video-based instruction modes ($n = 3$). Three studies utilized *audio-based instruction*, in which the instructor provided job coaching through an audio device or bug-in-ear device with two-way radio (i.e., covert audio coaching). Seven studies emphasized *picture or tactile-based instruction* in nontechnological forms based on picture prompts ($n = 5$), symbols and tactile cues ($n = 1$), or exploded view drawings ($n = 1$).

Twenty-two studies used one of four other intervention approaches that focused on the presence of a live instructor (i.e., direct instruction, AAC-assisted, simulation, and peer-delivered). Half ($n = 11$) used *direct instruction* where an instructor, not a technology-based or other stimulus, delivered procedures and was consistently present during the intervention. Instructors often used prompting cues or hierarchies ($n = 5$), sometimes within a package of instructional procedures ($n = 6$; for example, modeling and praise). Six studies involved using *AAC-assisted instruction* for students with complex communication needs. Five studies focused on improving students' interactions with coworkers or supervisors in the workplace setting using communication boards or books, and one trained a student to perform data entry with task-referenced icons

on his AAC device. Three studies focused on *simulation instruction*, in which participants were taught to perform employment skills in one location (e.g., school or day program) and then were evaluated on the skill in an actual community job site. Two studies involved *peer instruction* to introduce employment skills to participants.

Instructional Methods

Table 1 summarizes the 21 instructional methods employed across all studies. Studies commonly reported using performance feedback ($n = 36$), device-assisted instruction ($n = 34$), response prompting ($n = 33$), and community-based instruction ($n = 32$). All studies used multiple instructional methods as part of a package ($M = 5.5$, range = 2-12).

Instructors and Procedural Fidelity

Researchers delivered instruction in most studies (51.8%). Nonresearchers as instructors were more often associated with direct instruction, AAC-assisted instruction, simulation, and peer-delivered instruction than other intervention approaches. Classroom teachers were the instructors in almost one quarter of overall studies (23.4%), most of which occurred in school settings with direct instruction approaches. Other instructors were job coaches or vocational instructors (3.6%), peers (3.6%), graduate students (3.6%), paraprofessionals, (1.8%), or a combination of instructors with different roles (8.9%). The majority of studies (87.5%) did not describe the instructor training. Less than half of studies (48.2%) reported a fidelity measure to evaluate the quality of intervention delivery.

Other Intervention Features

Approximately half of studies did not report how frequently intervention sessions occurred (48.2%) or the length of sessions (57.1%). In studies reporting information, intervention frequency included 2 or more times daily ($n = 18$), 1 to 5 times weekly ($n = 10$), or only 1 time total ($n = 1$). Reported lengths of sessions ranged from less than 10 min ($n = 5$), 11 to 30 min ($n = 9$), 31 to 60 min ($n = 3$), and longer than 60 min ($n = 4$). Two thirds of studies ($n = 38$) administered the intervention in a one-to-one format. Three studies used partners (Alberto, Taber, & Fredrick, 1999; Rodi & Hughes, 2000; Woolcock, Lyon, & Woolcock, 1987), two used small groups (Gaylord-Ross, Forte, Storey, Gaylord-Ross, & Jameson, 1987; Malouf et al., 1986), and one used a large group (Fisher, 1984). About one fifth (20.2%) of studies did not report intervention format. Twelve studies included a pretraining phase prior to baseline in which participants were oriented how to use a technological device later used to aid them during the intervention. For example, technology-based interventions focused on instruction via a handheld prompting system, smartphone, or tablet typically included pretraining (e.g., Alberto et al., 1999; Bereznak, Ayres, Mechling, & Alexander, 2012; Cihak, Kessler, & Alberto, 2008). Pretraining was also common for studies in which participants learned to use AAC (e.g., Allgood, Heller, Easterbrooks, & Fredrick, 2009; McGregor, Young, Gerak, Thomas, & Vogelsberg, 1992).

Employment Outcomes

Primary employment outcomes are reported in Table 4. Half of studies ($n = 28$) used a task analysis to evaluate changes in skill completion or fluency. Other studies counted the occurrences of a target behavior (e.g., social interactions with customers; $n = 16$), independent task transitions ($n = 5$), rate of performance fluency or productivity ($n = 5$), or permanent product ($n = 1$; for example, placement of pieces in proper tray). The three most common types of employment tasks were clerical (e.g., photocopying, filing papers; $n = 12$), cleaning (e.g., mopping, washing dishes; $n = 10$), and retail (e.g., folding clothes, stocking items; $n = 7$). Some tasks considered by the authors to be employment-related are not typically associated with job skills, such as opening a locker (Fetko, Schuster, Harley, & Collins, 1999) or lifting weights (Zetts, Horvat, & Langone, 1995).

Table 4. Summary of Intervention Effects on Employment Skills Outcomes.

	Strong positive effect		Positive effect		Mixed effect		No effect	
Study types	*n*	%	*n*	%	*n*	%	*n*	%
By study design								
Single-case primary outcomes (*n* = 48)	26	54.2	18	37.5	4	8.3	0	0.0
Single-case generalization (*n* = 24)	—[a]	—[a]	16	33.3	8	16.7	0	0.0
Single-case maintenance (*n* = 35)	—[a]	—[a]	22	45.8	13	25.0	0	0.0
Group primary outcomes (n = 3)	3	100.0	0	0.0	0	0.0	0	0.0
By intervention approach								
Self-management (*n* = 12)	8	66.7	1	8.3	3	25.0	0	0.0
Video (*n* = 9)	7	77.8	1	11.1	1	22.2	0	0.0
Audio (*n* = 3)	1	33.3	2	66.7	0	0.0	0	0.0
Picture and tactile (*n* = 7)	7	100.0	0	0.0	0	0.0	0	0.0
Direct (*n* = 10)	3	30.0	6	60.0	0	0.0	0	0.0
Augmentative and alternative communication (*n* = 6)	1	16.7	5	83.3	0	0.0	0	0.0
Simulation (*n* = 3)	1	33.3	2	66.7	0	0.0	0	0.0
Peer-delivered (*n* = 2)	1	50.0	1	50.0	0	0.0	0	0.0

Note. The table displays the number and percentage of dependent variables coded in each category of effects for single-case design efficacy studies. Percentages reflect the proportion of studies that met criteria out of the proportion of eligible studies (*n* = 51 for all efficacy studies, *n* = 48 for single-case only, *n* = 3 for group design only).

[a]Differences between positive effect and strong positive effect were coded only for primary outcomes, not generalization or maintenance.

Experimental Design and Methodological Quality Indicators

Almost all (94.6%) studies used single-case design. Most used multiple baseline or multiple probe across participants (*n* = 25), tasks/skills (*n* = 12), settings (*n* = 7), or time period (*n* = 1). Other single-case designs included alternating treatment (*n* = 4), withdrawal (*n* = 2), adapted alternating treatment (*n* = 1), and reversal (*n* = 1). All group designs (*n* = 3) were randomized controlled trials.

Table 2 displays the number and percentage of studies satisfactorily meeting each quality indicator. Almost all studies met the indicator for reporting setting (94.6%) and intervention materials (98.2%). Only seven (12.5%) met the criterion for reporting participant demographics, and most (73.5%) that did not meet this criterion failed to report race/ethnicity. Studies were generally strong in demonstrating systematic control (96.4%) and indicators related to baseline (*M* = 89.2% across Indicators 6.2, 6.3, and 6.6). However, less than half of studies (46.4%) reported details related to procedural fidelity, eight studies (14.2%) exhibited potential threats to internal validity, and 10 studies (82.1%) failed to satisfactorily report reliability. All studies provided data needed for visual analysis (Gast & Spriggs, 2010) or analysis of group effect size.

Efficacy

Table 4 displays the intervention effects for the subset of studies evaluating the efficacy of a single intervention. All group-design studies showed a strong positive differential effect between treatment and control groups. Most interventions evaluated within single-case design studies (60.4%) had strong positive effects, 16.7% had positive effects, and 8.3% had mixed effects.

Five single-case design studies were comparative designs with results that could not be coded in the same way as the efficacy studies. Four studies compared two different elements of a technological intervention (i.e., video- or audio-based instruction; Bennett, Gutierrez, & Honsberger, 2013; Cihak & Schrader, 2008; Taber, Alberto, & Fredrick, 1998; Van Laarhoven, Kos, Pehlke, Johnson, & Burgin, 2014). In these studies, comparison effects were equal or showed negligible differences. Lee and Singer-Dudek (2012)

compared the effect of fluency versus accuracy training on the retention and endurance of two hardware assembly tasks and found the fluency training to produce higher rates of completion.

Twenty-four studies reported generalization data across settings (n = 10), employment tasks (n = 7), modes of instruction (e.g., new instructor or type of prompting; n = 3), partners (n = 2), or more than one of these (n = 2). Of studies assessing generalization, about half (n = 13) explicitly reported that no primary intervention strategies were present during these phases; otherwise strategies were present or the reporting was unclear. Approximately one third (n = 16) included at least three data points to assess generalization for each participant or tier. In nine studies, authors reported measuring generalization data only as a posttest. Generalization was measured within the context of single-case design (i.e., at least three data points per condition) in eight studies and with pre- and posttest (i.e., with less than three data points) in five studies. When measured, generalization data showed a positive effect (n = 16) or mixed effects (n = 8).

Thirty-five studies reported maintenance data after the intervention. The length of time between the intervention and the start of maintenance data collection ranged from immediately to 4 months (M = 12 days). Sixteen of these studies assessed maintenance with less than three data points for each participant or tier. When measured, data showed a positive effect for maintenance (i.e., comparable with levels at criterion; n = 22) or mixed effects (n = 12).

Social Validity

When assessed, most participants and key stakeholders reported their intervention approaches to be socially valid. Twenty-four studies (42.9%) assessed social validity of the intervention on one or more of the following components: goals (n = 24), outcomes (n = 18), or procedures (n = 16). Seventeen studies described who completed the questionnaire or interview. Respondents were participants (n = 5), instructors (n = 2), parents (n = 1), employers or coworkers (n = 3), or a group of different stakeholders (n = 6).

Discussion

Strong employment skills instruction and vocational training are needed in schools during the transition years to help prepare students with IDD for integrated employment. An understanding of *how* to teach employment skills is critical to advancing their postschool outcomes. We reviewed 56 studies on teaching employment skills to secondary school students with IDD between the ages of 14 and 22. Our findings provide insight into which interventions were successful (a) for which types of students, (b) with what approaches and instructional methods, (c) in what settings, and (d) for which outcomes. These findings are salient in several ways.

First, this literature offers considerable evidence of the efficacy of intervention approaches used to teach employment skills that can be drawn upon in schools. All eight intervention approaches had at least 75% of studies with strong positive or positive effects. The efficacy of these interventions is demonstrated widely across a variety of participants, settings, and outcomes. The plurality of positive effects across diverse groups and settings indicates a deepening evidence base of interventions to promote acquisition of employment skills. In addition, the availability of many promising opportunities expands the ways teachers and researchers might apply these intervention approaches to teach employment skills during the transition years.

Second, interventions were evaluated more often in some subsets of the population based on disability, age, gender, and school enrollment. For example, a large disparity exists between the number of participants with ID without autism (n = 141) versus those with autism without ID (n = 17). Because the needs of students with autism can differ from those of students with ID, the extent to which these practices can be applied to the growing number of students with autism warrants further exploration (Bennett & Dukes, 2013). Overall, reporting of participant demographics was weak. For example, most studies (86.8%) did not specify the race/ethnicity of participants. Moreover, when other demographic factors (e.g., severity of cognitive impairment, school enrollment) were reported, they were not reported consistently or were difficult to discern. Future researchers should consistently report demographic information to assist researchers and

research consumers. Furthermore, research should investigate which instructional practices are most appropriate and effective for particular students.

Third, the intervention approaches and instructional methods varied widely across studies. Most studies incorporated technology, whether in the form of a video, self-managed device, AAC device, or audio. Interestingly, technology-based interventions employed many of the same methods as did direct instruction approaches, either via device assistance or with a live instructor in addition to the device. Although many intervention modalities involve newly developed technology (e.g., smartphone, tablet), traditional instructional methods are the core of these approaches. For example, prompting hierarchies, time delay, performance feedback, response prompting, or modeling previously delivered through a direct instructor can now be embedded into a device. Given the ubiquitous role of technology in today's society, this shift in instructor modalities from human to portable device offers promising pathways for students with IDD to receive employment instruction in school, workplace, and community settings.

Fourth, more than half of studies (60.7%) included some community-based instruction during the primary intervention or generalization phase. The skills taught in community settings varied more than those taught in school settings, likely because practicing skills in a real workplace presented more opportunities for job-specific tasks than what is available in a typical classroom. Interventions including opportunities for self-management and independence in community workplaces may provide a more natural transition into integrated employment after high school. Thus, the need for community exposure and hands-on work experience for youth is advocated to ensure the skills being taught are relevant and meaningful (e.g., Test et al., 2014).

Fifth, this review identifies a varied collection of potential employment skills. Our findings do not provide a rank ordering of those employment skills most needed to equip young adults for integrated employment, but they do illustrate a collection of skills that might be paired with certain intervention approaches. For studies to be included in this review, the authors must have framed the skill as applicable to an employment setting. Clerical, janitorial, and social tasks were the most commonly targeted vocational categories, but less traditional skills were taught under the auspices of employment training (e.g., opening a locker, lifting weights). In addition, almost half of studies (42.8%) included a social component (i.e., opportunity to interact with others) in their dependent measures. Social skills are integral in helping students adapt to the dynamic and unpredictable nature of working in the community (Cannella-Malone & Schaefer, 2015; Park et al., 2016). Future research should target social skills in employment interventions in an intentional way to contribute to further develop this evidence base.

Limitations

Several limitations should be considered when interpreting findings from this review. First, in focusing solely on studies explicitly addressing employment skills, we may have excluded studies measuring the same or very similar skills whose authors assigned them to another domain of transition (e.g., functional, daily living, recreational). For example, one study using personal digital assistants to teach high school students with autism to manage household chores was excluded because the skills were not framed as employment-related (Gentry, Wallace, Kvarfordt, & Lynch, 2010), even though other included studies measured similar skills. Second, our ability to analyze instructional methods delivered as part of a larger intervention package was dependent on the quality of reporting by authors. Some authors did not provide thorough descriptions of their intervention approaches, experimental procedures, and instructor training. As was the case with participant demographics, we could only draw conclusions based on the quality of reporting across studies. Third, while we strove to ensure a comprehensive search across a wide body of literature, this collection of studies may be influenced by publication bias as they were required to have been published in peer-reviewed journals.

Implications for Research

The results of this review have several important implications for researchers. First, more research in the area of employment instruction is needed to support legislation and policy promoting integrated

employment for individuals with IDD (e.g., Employment First, Workforce Innovation and Opportunity Act). Although legislation is integral to advancing employment opportunities for this population, low employment rates are unlikely to change until young adults are adequately prepared to demonstrate proficiency in needed vocational skills. Thus, efforts to equip students for the workforce must be accompanied by evidence-based practices.

Second, less than one quarter (24.6%) of participants across these studies were reported to have severe to profound cognitive impairment. To ensure that integrated employment can become a viable option for all students upon completing high school, more research is needed targeting students with severe disabilities. It is imperative for researchers to understand effective intervention approaches and instructional methods to teach employment skills best fit for this population.

Third, with only five comparative studies, this review cannot provide a ranking of the *most* effective practices (i.e., in comparison with others). As demonstration studies often compare interventions with baseline phases in which no reported instruction was provided, they can only show that teaching something is more effective than providing no instruction. Moving forward, the field needs more comparative studies to determine which interventions work best for certain outcomes when other conditions (e.g., participants, settings) are the same.

Fourth, replication will be challenging if the lack of reporting of design features and intervention procedures persists. The absence of reporting is especially noticeable regarding instructor information (i.e., who delivered the intervention, the extent to which instructors were trained beforehand, and how fidelity was measured). Further research should include thorough reporting of participants, procedures, and results to ensure accessibility and replication.

Implications for Practice

These findings have implications for practitioners and stakeholders who work with transition-age students with IDD (e.g., teachers, job coaches, employers). First, the review highlights eight intervention approaches and 21 instructional methods used to teach employment skills to secondary students with IDD. These findings can be drawn upon by teachers as they plan and implement the best approaches with their students. Second, it is important to note that the effective interventions evaluated in this review are not necessarily those with the most expensive, cutting-edge technology. Rather, it seemed to be a combination of instructional methods that led to successful teaching. Because of advances in technology and recognition of other types of stimulus devices, live instructors need not always be the primary agents of instruction. However, instructors must know how to plan interventions best suited for specific students and outcomes. Third, school-based practitioners should consider ways to teach employment skills in the community. More than 60% of studies in this review included instruction or generalization in a community setting. As supported by prior literature (e.g., Cannella-Malone & Schaefer, 2015; Test et al., 2014), teaching employment skills in the context of hands-on work experience can help prepare transition-age students for integrated employment.

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