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A Systematic Review of the Effects of Curricular Interventions on  
the Acquisition of Functional Life Skills by Youth with Disabilities

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### Abstract

The relationship between functional/life skills curricula (the intervention) and transition-related outcomes for secondary aged youth with disabilities was explored in this systematic review. A total of 50 studies intervening with 482 youth with (largely) disability labels of moderate to severe mental retardation were reviewed. The findings of this review provide tentative support for the efficacy of using functional/life skills curricular interventions across educational environments, disability types, ages, and gender in promoting positive transition-related outcomes. A series of more detailed implications for practice are suggested as well as directions to the reader to locate more detailed descriptions of how these interventions might be implemented in their secondary educational environments.

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Purpose

*Introduction*

The purpose of this practice-based systematic review is to summarize the scientifically-based research studies that have been produced in the past two decades focused on the effects of interventions associated with domestic/self-help life skills curricula, community participation life skills curricula, and recreation/leisure life skills curricula, on samples of secondary-aged youth with disabilities.

By *scientifically-based research studies* we mean reports of original research that meet recently enacted federal research standards (Education Sciences Reform Act of 2002) for which are stated in the Act as follows:

The term “scientifically-based research standards” means research standards that – (i) apply rigorous, systematic, and objective methodology to obtain reliable and valid knowledge relevant to education activities and programs: and (ii) present findings and make claims that are appropriate to and supported by the methods that have been employed (p. 4).

These scientifically-based research studies can be reports of research employing group-based designs, single participant designs, or qualitative designs, but they must report adequate evidence of attention to the validity and reliability standards for the particular design used and be consistent with commonly accepted methodological canons for well-implemented research.

By *life skills curricular focus* we mean original research studies that reported on the effects of implementing an intervention that had as its defining characteristic acquisition of a

functional life skill(s) in at least one of three areas: (a) recreation and/or leisure; (2) maintaining a home and/or personal care; and/or (c) participation in the community. Life skills interventions designed to increase academic, social/communicative, and vocational competence for youth with disabilities are not included in this review (separate reviews are underway in each of these areas; a rationale for this is provided later in this paper [see p. 6]).

Finally, by *samples of secondary-aged youth with disabilities* we mean original research studies whose samples were either exclusively youth with disabilities or were, in part, youth with disabilities and outcome measures for those youth with disabilities were reported separately. These youth must have been enrolled in secondary school environments or, if in non-graded residential or day treatment facilities, the studies must have reported the ages of those youth with disabilities as ages 13-22 inclusive.

The conceptual framework we used to guide our philosophical orientation to this systematic review is grounded in the ecological model of social functioning to help answer “what works” questions regarding life skills acquisition by youth with disabilities. An ecological framework provided the necessary conceptual structure to guide the scope, the methodology, and the development of this research synthesis. The question of “what works” can be translated by the classical ecological question posed by Wachs (1987): Under what environments (situations, programs and settings) have what kinds of persons (the diverse characteristics of all youth with disabilities) changed in what kinds of behaviors (acquisition of functional life skills in one of the aforementioned curricular areas)?

This ecological framework focuses on the transactional relationship among persons, environments and behaviors and was first introduced in 1936 by Karl Lewin. Since Lewin’s work, the application of the ecological framework has impacted much of the theoretical and

implementation strategies associated with a wide range of human services and education. The ecological approach to understanding human behavior is well documented in the field of psychology (Bandura, 1979; Barker, 1968; Moos, 1976; Wicker, 1979).

### Background

In 1976, the field of special education for students with severe disabilities was relatively new, and largely predicated on techniques of applied behavioral analysis (Nietupski & Nietupski, 1997). The empirical studies from this time period documented that children and youth with significant disabilities could learn. Findings from follow-up studies of special education graduates conducted in the late 1970's and early 1980's influenced a refinement of educational emphasis, from an emphasis on developmental and readiness skills instruction, to interventions designed to teach functional life skills. Early life skills advocates such as Brown, Nietupski, and Hamre-Nietupski (1976), and Brown, Branston, Hamre-Nietupski, Pumpian, Certo, and Gruenewald (1979) felt that "educators should prepare students to function in integrated society" (Nietupski & Nietupski, 1997, p. 37). This called for curricula focused on teaching the skills required to participate in the typical life spaces of adults in our society: vocational, educational (post-secondary educational environments), domestic, recreational, and community environments.

The premise that students need to be taught the skills necessary to successfully function as adults has also been well documented in the literature on students with learning disabilities (albeit, more recently; Clark, Field, Patton, Brolin, & Sitlington, 1994; Cronin, 1996). Through a systematic review of the theoretical and empirical literature on life skills instruction for youth with learning disabilities, Cronin found that despite numerous theoretical recommendations for life skills instruction (e.g., Sitlington, 1996), as well as empirical support for it evidenced in the

follow up studies of Sitlington and Frank (1993), Sitlington, Frank, and Carson (1993), and Wagner, Blackorby, Cameto, Hebbeler, and Newman (1993), there exist a dearth of empirical studies conducted on life skills instruction for students with learning disabilities, particularly when compared to the intervention literature in moderate-severe disabilities.

For all youth with disabilities, a factor delimiting the scope of life skills instruction in the 1980's was precipitated by Madeleine Will's publication of "Bridges" in 1984, which emphasized the need for vocational focus in transition programming. This federal emphasis on vocational programming influenced public policy and educational practices for years to follow. In the early 1990's, many experts and practitioners in the field of special education sought to reinterpret and broaden this focus, and advocated for a more comprehensive conceptualization of, and approach to, transition services (Halpern, 1993; 1994b). Halpern (1994a) provided a comprehensive and frequently cited definition of transition for youth with disabilities:

Transition refers to a change in status from behaving primarily as a student to assuming emergent adult roles in the community. These roles include employment, participating in post-secondary education, maintaining a home, becoming appropriately involved in the community, and experiencing satisfactory personal and social relationships. The process of enhancing transition involves the participation and coordination of school programs, adult service agencies, and natural supports within the community. The foundations of transition should be laid during the elementary and middle school years, guided by the broad concept of career development. Transition planning should begin no later than age 14, and students should be encouraged, to the full extent of their capabilities, to assume a maximum amount of responsibility for such planning (p. 116).

This more comprehensive definition of transition is utilized in the IDEA regulations of 1997 and 2004, and thus provides the theoretical framework for our review work; as well, our rationale for conceptualizing separate reviews for empirical evidence of interventions designed to impact employment, post-secondary education, social and communicative skills (experiencing satisfactory personal and social relationships), and the particular focus of the current review:

maintaining a home, and becoming appropriately involved in the community (i.e., domestic, recreation, and community participation life skills).

*Definition of Functional Life Skills and the Focus of this Review*

Cronin (1996) defined life skills as “those skills or tasks that contribute to the successful, independent functioning of an individual in adulthood” (p. 54). These may generally be grouped in five broad clusters of skills (aligned with Halpern’s 1994 definition of comprehensive transition services): self-care and domestic living, recreation and leisure, communication and social skills, vocational skills, and other skills vital for community participation (such as post-secondary education) (Nietupski & Hamre-Nietupski, 1997, p. 38). This review focuses exclusively on three of these five curricular domains – those curricular interventions designed to teach self-care and domestic skills, recreation and leisure skills, and personal competence in community living skills. This first review will be followed by two others under the “life skills umbrella”: social and communicative skills interventions, and vocational interventions.

It is important to note too that many practitioners also include academics, especially functional literacy and numeracy, in their definition of functional life skills. We have chosen not to include these “academic” life skills in this review as we will be including this curricular focus within several topical reviews of various interventions designed to impact the academic competence of youth with disabilities in later reviews. Finally, we have not included studies on postsecondary academic outcomes (e.g., involvement in higher education), as OSEP has concurrently established another review group located at the University of Hawaii, Center for Disability Studies: the *Post-Outcomes Network of the National Center on Secondary Education and Transition*, <http://www.ncset.hawaii.edu/>, charged with this mission.

### *Description of Practice*

To date, there have been multiple reviews conducted relative to both the *content* of life skills curricula (e.g., grocery shopping and meal preparation); as well as various *instructional strategies* designed to teach specific life skills (e.g., time delay and prompting strategies). In this next section, we highlight examples of each.

*Reviews focused on life skills content.* Marchand-Martella, Smith, and Agran (1992) conducted a systematic review of food preparation and meal planning for persons with disabilities, including in their review a focus on nutritional content of meal planning and preparation. They found that although a number of studies had reported successful instructional strategies for teaching component skills of meal planning and preparation, relatively little attention had been paid to nutritional content beyond the four food groups, and made suggestions to practitioners for remedying this. A few years later, Morse and Schuster (1996) conducted a systematic review of grocery shopping skills for persons with moderate to profound cognitive disabilities, and discussed both the need for this instruction and several instructional variables for consideration, including maintenance, generalization, reliability, and social validity.

Lynch, Kellow, and Willson (1997) conducted a meta-analysis of several studies of the impact of deinstitutionalization on the adaptive behavior of adults with disabilities and found that the adaptive behaviors most positively influenced by community placement were related to self-care. Communication, academic, social, and community living skills, as well as physical development, were also reportedly influenced, but to a lesser degree. A review completed at the University of Minnesota in 1999 (Kim, Larson, & Lakin, 2001) reported similar results.

Lim, Lin, and Browder (2002) conducted a systematic review of applications of “motion study” in developmental disabilities from 1990-1999, “an engineering technology that analyzes human body motions”. They reported that the application of motion study principles as an

antecedent guide and practice to eliminate or reduce ineffective motions and simplify effective motions resulted in positive task outcomes for a majority of participants.

Most recently, Xin, Grasso, Dipipi-Hoy, and Jitendra (2005) conducted a meta-analysis of the effects of purchasing skill instruction for persons (across school-age children and adults) with developmental disabilities. Because the studies they ultimately included in their work exclusively employed single participant designs, so they utilized a non-parametric procedure to estimate treatment effect sizes (percentage of non-overlapping data points, or PND), and reported a moderately positive effect for purchasing skills instruction across the studies. They also reported large and moderate effects for maintenance and generalization of acquired skills, respectively.

*Reviews focused on **instructional strategies** to teach specific life skills.* In the literature with a life skills curricular focus for youth with disabilities, a number of different strategies comprise the instructional universe. Particularly for learners with significant cognitive impairment, instructional strategies commonly appearing in the literature include antecedent errorless learning strategies such as stimulus shaping procedures, time delay (or delayed prompting) (Touchette, 1971) and prompt/ fade (or response prompting) strategies, all designed to highlight natural cues and then transfer stimulus control to the natural cue (Browder & Lalli, 1991). A second group of instructional strategies are grouped as consequent manipulations, such as error correction procedures and various schedules of differential reinforcement (Browder & Lalli, 1991). For learners with milder cognitive disabilities, such as mild mental retardation or learning disabilities, instructional strategies also include group learning strategies (demonstration, modeling, role-play, guided practice, and scaffolding, to name a few), direct instruction (e.g., Gersten, 1985) and mnemonic strategies (e.g., Mastropieri, 1985).

A number of researchers have investigated the effectiveness of various instructional strategies to teach “life” and other skills to youth with disabilities; as well, numerous systematic reviews - a few incorporating meta-analytic techniques - of specific instructional strategies have been published. Examples pertinent to personal care or maintaining a home, recreation, or general community participation follow (those pertinent to the vocational, social/ communicative and academic domains will be explored in those reviews).

Defining “chaining” as a specified series of responses, each associated with a stimulus condition, with delivery of a reinforcer at end of the task sequence, Spooner and Spooner (1984, p. 114) conducted a systematic review of chaining techniques, including forward, backward, and total task or concurrent chains, all predicated on component or task analysis (Sailor & Guess, 1983). They reported mixed results across studies, concluding that individual learning styles influence which type of chaining technique is most effective for different learners.

Handen and Zane (1987) conducted a systematic review of studies using “delayed prompting”, and described procedural variations and corresponding results. The underlying theory in delayed prompting (or time delay) is that the student will initiate the desired behavior before the presentation of the prompt. They found it to be an efficient strategy for children and adults with and without disabilities, but suggested further research, particularly because there was little reported maintenance of skill information in the evidence base at that time.

Defining “time delay” more specifically as the presentation of a controlling prompt (a teacher behavior that ensures a correct student response) that is faded along a dimension of time until stimulus control is transferred to the discriminative stimulus (e.g., the task request), Wolery, et al., (1992) reviewed some 36 studies that used constant time delay to teach discrete tasks; behaviors that had a relatively short duration, were taught as a single unit, and did not involve a task analysis, such as sight word reading, spelling and manual signing. They found that constant

time delay was effective with discrete task instruction, and also reported an evaluative component of the literature they reviewed, noting that the studies comprising the research base with this instructional strategy were adequately conducted.

Likewise, constant time delay has been used to teach chained tasks. Defined as “those [tasks] that involve a number of behaviors sequenced together to form a complex skill” (Wolery, et al., 1992, p. 49), examples of tasks which might be chained include making a sandwich, shopping for grocery items, taking a shower or getting dressed. Typically a task analysis is developed to identify individual behaviors that comprise the skill. Schuster, Morse, Ault, Doyle, Crawford, and Wolery (1998) reviewed some 20 articles investigating the effectiveness of constant time delay with chained tasks. Participants were typically adolescents and representative of different types of disabilities across the studies, including mild, moderate, severe, or profound developmental disabilities. Skills taught included reading sight words, spelling, identifying numerals, cooking, banking, and laundry skills. Analyzing four dimensions in the studies reviewed: (a) demographic variables, (b) procedural parameters, (c) outcomes and outcome measures, and (d) methodological adequacy, the authors found that across all students in all studies (65/67), with two exceptions (preschoolers with multiple disabilities, who learned some of the steps in the task sequences, but not all), constant time delay was effective in teaching the targeted skills.

More recently, Post and Storey (2002) conducted a systematic review of selected literature on the use of auditory prompting systems with persons with moderate to severe disabilities. Auditory prompting systems have been used to train a variety of tasks – especially in vocational and domestic environments. The reviewers concluded that the use of auditory prompts consistently decreased prompt dependency on trainers (e.g., less reliance on instructors

or job coaches), while increasing independent task performance, as well positively impacting task fluency and quality.

### *Summary*

While there are several current reviews explicating instructional strategies to teach life skills – some incorporating meta-analytic techniques – this review adds to the literature base of reviews in important ways. First, the focus of this review includes only studies that combine the use of a life skills intervention and measurement of one or more life skills outcomes (related to community participation, leisure skills, personal care or maintaining a home) exclusively (or in large part) for secondary aged youth with identified disabilities. While this niche alone makes this review unique, we have also required every study included in this review to meet minimum standards of internal and external validity (see Table 1 for an example of the standards and rubric used to assess the studies in our review that employed group quantitative, single participant, and qualitative designs). The standards and assessment rubric in Table 1 were adapted from early design work completed by meta-analysts and systematic review experts at both the Evidence for Policy and Practice Information and Coordinating Centre (EPPI-Centre) at the University of London, and at the What Works Clearinghouse (WWC) in the U. S. Department’s Institute of Educational Sciences (see their respective websites at <http://eppi.ioe.ac.uk/EPPIWeb/home.aspx> and <http://www.whatworks.ed.gov/>). Hence, our review should be considered evidence-based.

### Search Strategy

#### *Sources*

The search parameters and procedures described below were utilized to establish the databases for several reviews being conducted by the *What Works in Transition Systematic Review Project*, of which this review represents one of a number of published and forthcoming reviews (see Alwell & Cobb, 2006; Cobb, Sample, Alwell, & Johns, 2006). Therefore, some of

the search terms included here may not be immediately pertinent to “life skills curricular interventions.” Nonetheless, these were the search terms that produced the literature set for this review, so all terms that were used are delineated.

To establish the most inclusionary literature set possible, extensive systematic searches were conducted of relevant electronic databases, hand searches of selected journals, author searches, and searches of selected reference lists, especially of review articles. Two project staff members consulted with a literature search expert from the University of London to design and conduct the electronic searches. The databases that were searched included ERIC (Ovid and Cambridge), PsycINFO (Ovid), and Medline (Ovid). All possible disability, intervention, outcome, setting, and age terms were first identified using database thesauruses.

In addition to the electronic searches described above, a list of ten representative journals was developed based on the recommendations of transition experts (a sample of the most prolific in special education transition, as well as a few representing low incidence disabilities) and a random sample (20% of 520 issues) of these journals were searched by hand by four staff members, beginning with 1990 publications and inclusive of December 2003. These searches yielded 7 articles not already retrieved in the electronic search process; these were added to our database (and only 1 resulted in an article that ultimately met our inclusionary criteria).

### *Search Terms*

*Disability terms included<sup>1</sup>*: disabilities, emotionally disturbed, learning disabilities, mental retardation, attention deficit disorder, autism, deaf, deaf blind, blind, vision impairment, physical disability, speech language disability, multiple disabilities, orthopedic impairment, special education student(s).

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<sup>1</sup> Note: Each of these terms were category headers in the database thesauruses consulted, and included numerous other disability terms, inclusive of all possible labels.

*Intervention terms included:* teaching, learning, special education, best practices, educational programs, community services, classroom discipline, school counseling, dropout prevention, job coaching, supported employment, community based instruction, behavior management, interagency collaboration, inclusive education, assistive technology, speech therapy, vocational rehabilitation.

*Outcome terms included:* academic achievement, academic anxiety, education attainment level, achievement, diploma, school graduation, school expulsion, dropout, resiliency, school suspension, school retention, truancy, persistence, employment, employment status, GED, outcomes of education, treatment outcomes, outcomes of treatment, quality of life, recreation, relationships, school to work, transition, school -to -work transition, school transition, work, jobs, employment, independent living.

*Setting terms included:* schools, residential care facility, accelerated programs, accelerated schools, alternative education, nontraditional education, alternative programs, alternative schools, colleges, community college, correctional institutions, high schools, middle schools, secondary education, higher education, junior high schools, mainstreaming, home school, technical school, vocational school, vocational education, vocational high school.

The outcome of all literature searching processes described resulted in approximately 560 studies for which we acquired full-text reports/journal articles and that appeared promising as intervention-based studies with secondary transition-based outcomes (cf. Halpern, 1994a). These 560 studies then were screened for propriety for our meta-analysis interests – that is, that they were intervention based, that they had a measured outcome, that the sample was youth with disabilities, and that the age/grade level of those youth was between 12 and 22 years old and in secondary school environments. The reduction in the number of studies associated with this screening process was from the original 560 studies to 388 studies.

These 388 studies were then subjected to a three-stage coding process whereby a primary coder extracted all the relevant information from those studies for this review; a secondary coder completed a semi-independent coding process similar to that used by the primary coder; and a consensus process was used to settle differences in codes assigned by the primary and secondary coders. This dual coding process resulted in removal of 60% of the studies from consideration in this review. By far, the most typical reason for the removal of studies from consideration was lack of sufficient data reported in the study with which to calculate an effect size. Other less frequently encountered reasons included inadequate specification of the intervention, inadequate specification of the outcome measure, lack of clarity on whether or not the subjects sampled in the study were actually youth with disabilities, and a host of design inadequacies such as an insufficient number of participants, conditions, or settings in single participant studies, or lack of any assurances of comparability of groups in non-randomized group design studies.

The final set of studies that made up the entire database of secondary transition studies numbered 156 studies. At this point an inductive process was used by all staff associated with this review wherein the 156 studies were sorted into a total of six common intervention constructs – life skills (domestic, leisure and community) curricular interventions, social and communicative life skills interventions, vocational interventions, counseling interventions, transition planning interventions and interventions designed to teach self-determination. Fifty (50) studies measured interventions that conformed to community, domestic, and leisure life skills curricula and are the subject for this review.

### *Selection Criteria*

Youth with disabilities, ages 12-22 and in secondary school, must have comprised exclusively the sample in these studies, or if they were only part of the sample, there must have been separate data reported for the sub-sample of youth with disabilities such that effect sizes

could be calculated for this sub-sample. The only exception to this criterion were *ex post facto* studies whose samples were older than age 22, but whose focus was retrospective estimates of the efficacy of interventions that occurred while the sample was within the 12-22 age range.

Outcomes must have related directly or indirectly to the acquisition, maintenance, and generalization of functional life skills; that is, recreation and/or leisure skills, skills related to maintaining a home and/ or personal care, and/or interventions designed to increase participation in the community, such as crossing streets, using public transportation, using stores, restaurants, banks, libraries, and parks. All studies using some form of disciplined inquiry were eligible for inclusion in this review provided they conformed to the criteria above and met minimum methodological standards for internal and external validity. These included between groups comparison studies, one group pretest-posttest studies, single participant studies, and qualitative studies.

### Search Results

Fifty (50) studies were located that fit the intervention, outcome, and sampling selection criteria for this review, and whose methodological features were judged to meet minimally acceptable standards of internal and external validity. Just four (or 8%) of the studies were published between 2000- 2003; twenty-nine (or 58%) of the studies were published in the 1990's; and the remaining seventeen (or 34%) of the studies were published between 1984 and 1989. The bulk of the studies included in this review were conducted prior to 1996 (76%). Selected characteristics of the settings and participants in the studies are highlighted in Table 2. Studies are grouped by curricular areas in Table 3, and information is provided on the designs employed, and characteristics of the intervention and the outcome(s) measured in the studies.

### *Settings*

These are life skills curricular interventions focused on community, recreation, and self-care life spaces; by definition we would expect to see studies conducted in multiple natural environments, such as community, recreation, and home settings; this was the case in the studies included in this review, although many were also conducted in more segregated (disability only) environments. Several studies designed to teach money or recreation skills were first taught in self-contained classrooms on regular school campuses with generalization probes conducted in banks and stores located in the community (e.g., Branham, Collins, Schuster, & Klienert, 1999; Gast, Winterling, Wolery, & Farmer, 1992; Wissick, Lloyd, & Kinzie, 1992). A few were conducted exclusively in the community (e.g., Collins, Hall & Branson, 1997; Frea, 1997; Vandercook, 1991). Some skills were appropriately taught (at least in part) in students' homes (e.g., Haring, Kennedy, Adams, & Pitts-Conway, 1987; Haring, Breen, Weiner, & Kennedy, 1995), group homes (e.g., Arnold-Reid, Schloss, & Alper, 1997) or apartments used by secondary special education programs for skills instruction (e.g., Heal, Colson, & Gross, 1984; Nietupski et al., 1986). Some studies were conducted largely in segregated residential, vocational, or rehabilitation facilities (e.g., Aeschleman & Gedig, 1985; Browning, 1985; Cuvo, Davis, & Gluck, 1991). A few were conducted in large institutions, such as the recreation skills taught by Johnson, Hunt and Siebert (1994); three were conducted in residential state schools for the blind (Horsfall & Maggs, 1986; Macdonald, Manning, & Souther, 1985; Trask-Tyler, Grossi, & Heward, 1995). There were also four international studies which met our review criteria: Gumpel and Nativ-Ari-Am (2001), Hastings, Raymond, and McLaughlin (1989), Lee and Tang, (1998), and Ninot, Bilard, Delignieres, and Sokolowski (2000), conducted in Israel, Canada, Hong Kong, and France, respectively. The first was carried out in a segregated school with probes in grocery stores in the community, the second in resource rooms in several Canadian high schools, and the

last two in special schools in Hong Kong and France. Those conducted in the United States are representative of rural and urban environments across the country. None of these studies were conducted in general education classrooms.

### *Participants*

The fifty studies in this review explored the effects of various life skills interventions on a total of 482 participants. The vast majority of participants across the studies were labeled as experiencing moderate-to-severe cognitive disabilities. Nine of the studies included participants with mild cognitive disabilities; three of these also included students labeled with learning disabilities (Cuvo, et al., 1991; Hastings, et al., 1989; Llewellyn & McLaughlin, 1986). Five studies focused on students with autism; of these, one examined students with autism and hearing impairments (Collins, Stinson, & Land, 1993), two studies identified autism as the only label (Frea, 1997; Gunter, Fox, McEvoy, Shores, & Denny, 1993); and two studies included students who experienced both autism and moderate-to-severe mental retardation (Haring, et al., 1987; Haring, et al., 1995). Three studies included students labeled as experiencing multiple disabilities (Browning, 1985; Fisher & Field, 1985; Vandercook, 1991). A single study included participants with exclusively physical disabilities (McGill & Vogtle, 2001) and three others had participants with physical disabilities (cerebral palsy or acquired brain injury) and cognitive disabilities (Dunn, Cunningham, & Backman 1988; Mechling, Gast, & Langone, 2002; Ulicny, Adler, & Jones, 1990). The participants in four studies had visual impairments. Of these, one focused on blind students exclusively (MacDonald, et al., 1985), and the participants in the three other studies had visual and mild or moderate cognitive disabilities (Gumpel & Nativ-Ari-Am, 2001; Horsfall & Maggs, 1986; Trask-Tyler, et al., 1995). A single study (Evans, Evans, Schmid, & Pennypacker, 1985) focused on students labeled exclusively emotionally disturbed or behavior disordered.

Thirty-nine of the 50 studies reported ages of participants such that averages could easily be calculated. These estimates ranged from an average age of 13.4 years to 21.83 years ( $M = 17.6$  [unweighted]). Eight studies reported age ranges for their participants, and these ranges spanned the 10 to 21 years, 10 months age range<sup>2</sup>. The remaining three studies reported descriptive labels in lieu of ages: “high school age” or “young adults”. Gender appeared fairly balanced across this group of studies. Six studies (Cuvo, et al., 1991; Cuvo, Davis, O’Reilly, Mooney, & Crowley, 1992; Evans, et al., 1985; Heal, et al., 1984; MacDonald, et al., 1985; McDonnell, Hardman, Hightower, Keifer-O’Donnell, & Drew, 1993) did not report gender percentages. While seven studies (Arnold-Reid, et al., 1997; Dunn, et. al., 1998; Frea, 1997; Gunter, et al., 1993; Johnson, et al., 1994; Keogh, Faw, Whitman, & Reid, 1984; Schloss, Alper, Young, Arnold-Reid, Aylward, & Dudenhoefter, 1995) involved participants who were exclusively male, the total  $n$  in these studies is just 15. Only one study (Mechling, et al., 2002) involved female only participants.

#### *Research Designs and Calculation of Effect Sizes*

Forty-nine of the 50 studies in this review were classified as quantitative in design; only the McGill and Vogtle (2001) employed a qualitative design. Of the 49 quantitative designs, eight were classified as between group designs, two were single group pretest-posttest designs, and one was a crossover design. The great majority (38 of 49, or 78%) employed a variety of single participant designs, most commonly multiple baseline designs across participants, behaviors or tasks, or settings, in that order.

*Between groups designs.* Four of the eight studies would be considered true experimental designs since each used randomization in some form, including randomized matching

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<sup>2</sup> Just one study included ages as low as 10- but the mean was within our age range (13-22). The majority spanned 13-21.

(Browning, 1985), cluster randomized assignment of classes to groups (Fisher & Field, 1985), or randomized assignment of participants to groups (Cuvo, et al., 1991; Westling et al., 1990). The other four were quasi-experimental, non-equivalent control group designs (Zhang, Gast, Horvat, & Dattilo, 1995; Mahon & Bullock, 1992; Lee & Tang, 1988; MacDonald et al., 1985).

In order to compute the effect size for these studies, a gain score approach was taken. Briefly, the gain between the pretest and posttest for the comparison group was subtracted from the gain between the pretest and posttest for the intervention group and then divided by the pooled (intervention and control group) standard deviation of the posttest. The pooled standard deviations of the posttest scores is used because, according to Lipsey and Wilson (2001), the standard deviation of the gain scores reflects treatment variability whereas the standard deviation of the posttest scores reflect variability on the outcome measure. This formula is as follows:

$$ES_{sg} = \frac{\bar{G}_I - \bar{G}_C}{S_{post\ pooled}}$$

The formula that we used for weighting studies was the inverse variance formula that is typically used in meta-analysis, and is calculated from the following formula:

$$w_{sg} = \frac{1}{SE_{sg}^2}$$

*Single participant designs.* Of the 38 single participant design studies, all but one employed variations of multiple baseline designs. The exception was Miller and Test (1989), who employed a multi-element, alternating treatment design to teach laundry skills to students with moderate mental retardation. Twenty-four of the 38 studies employed multiple baselines across participants designs. Of these, four also incorporated multiple probes, four looked at participants and behaviors, and Wacker, Berg, Wiggins, Muldoon, and Cavanaugh (1985) added alternating treatments to their multiple baseline design. Only one of these studies explicitly

mentioned random assignment of participants to baselines (Gumpel, 2001). Eight studies incorporated multiple baselines across tasks or behaviors as their primary research design; four of these eight then conducted replications with other participants, and one, (Gunter, et al., 1993) added withdrawal of treatment to their multiple baseline across tasks design. The remaining six studies employed multiple baselines across settings. One of these also used multiple probes and added replications across participants to their designs.

Effect sizes were calculated for single participant designs using “Approach One – No Assumptions” put forward by Busk and Serlin (1992). In this method, for each participant, an average of the baseline data points was computed, a separate average of the intervention data points was computed, and the standard deviation of the baseline was computed. The baseline average was then subtracted from the intervention average and divided by the standard deviation of the baseline. Thus a separate effect size was computed for each participant. However, in this review, we computed only compute *one effect size per study*, we modified the Busk and Serlin (1992) method by taking a weighted average of the baselines for all of the participants and subtracting a weighted average of the interventions for all of the participants and then dividing this result by the *pooled* standard deviation of the baselines of all of the participants.

*Single group pretest-posttest designs.* Two studies reported using single group pretest posttest designs (Llewellyn & McLaughlin, 1986; McDonnell, et al., 1993) and one study (Heal, et al., 1984) employed a crossover design. We used the effect size for pre-post contrasts in the form of the standardized mean difference developed for meta-analyses by Becker (1988) (See Lipsey & Wilson, 2001, p. 44 as well). With these formulae, the effect size estimate depended on the correlation between the pretest and posttest scores. Becker (1988), for example, showed that it can be calculated as:

$$ES_{sg} = \frac{\bar{G}}{s_g / \sqrt{2(1-r)}}$$

where  $\bar{G}$  is mean of the gain

where  $s_g$  is standard deviation of the gain

In order to get a weight for each study in this systematic review we used the following formula from Becker (1988):

$$w_{sg} = \frac{1}{SE_{sg}^2} = \frac{2n}{4(1-r) + ES_{sg}^2}$$

To find the correlation,  $r$ , for each of these three studies for the computation of the effect size and for the weight for each study in the meta-analysis, we needed to estimate the correlation since it was not provided by the original authors of any of the studies. These  $r$ -values depended on the standard deviations of the pretest and posttest scores as well as the standard deviation of the difference scores. We estimated  $r$  to be .57 using the following formula:

$$r = \frac{(\text{Variance}_{pre} + \text{Variance}_{post}) - \text{Variance}_{diff}}{2\sqrt{\text{Variance}_{post} * \text{Variance}_{pre}}}$$

### *Outcomes*

Outcomes associated with each study generally resulted in acquisition of skills taught, and in many cases, maintenance of skills over time, as well as generalization of skills to previously untrained environments. Since this review is of life skills curricular interventions, outcomes are directly associated with the various curricula measured, and are grouped by themes in Table 3.

### *Characteristics of Life Skills Interventions*

*Money and purchasing skills.* Five studies taught components of budgeting skills, with task analysis, prompting and differential reinforcement, and computer assisted instruction. Two

taught counting bills with a “one more than” strategy; one taught speed counting bills and change, and eight taught purchasing skills, one with videotape modeling in the classroom and generalization probes in real stores (Haring, et al., 1995). General case programming (c.f. Horner & Albin, 1988) was also a feature of this instruction.

*Other community-based instruction.* Two studies employed task analysis and time delay to teach students to cross streets safely (Branham, et al., 1999; Collins, et al., 1993); one measured the efficacy of functional sight word training in the community (Schloss, et al., 1995); Heal, et al., (1984) measured instruction on a variety of community skills, and a qualitative study incorporated interviews students with physical disabilities about their exclusion from Driver’s Education classes (McGill & Vogtle, 2001).

*Self-protection curricula.* Three studies were focused on teaching students self-protection curricula through a small group format: modeling, pictures, discussion, rehearsal shaping reinforcement and feedback (Fisher & Field, 1985; Lee & Tang, 1988; Llewellyn & McLaughlin, 1986).

*Leisure skills.* Three groups of studies were included in this section. The first included interventions designed to teach specific games or activities through task analysis and response prompting strategies (e.g, Collins, et al, 1997); the second group of interventions included participation in exercise classes through modeling and shaping (e.g., Zetts, Horvat, & Langone, 1995); the third group included a focus on the efficacy of leisure awareness education, curricula exposing students to leisure options in their communities (e.g., Hoge, Datillo, & Williams, 1999).

*Domestic or home-keeping skills.* Four studies included in this section measured the efficacy of task analysis and a system of least prompts to teach cleaning skills (e.g., Domaracki & Lyon, 1992); one measured the effects of modeling and a correction procedure to teach

removing broken glass from a sink to students with cognitive disabilities (Winterling, Gast, Wolery, & Farmer, 1992); and three studies employed response prompting to teach cooking and meal preparation skills (e.g., Horsfall & Maggs, 1986) – one of these adding auditory cues to follow simple recipes (Trask-Tyler, et al., 1995). Two other studies complete this section- the first measured the effects of a system of most-to-least prompts and constant time delay to teach laundry skills (Miller & Test, 1989); the last incorporated tactile cues to teach sewing machine use to blind students (MacDonald, et al, 1985).

Table 3 is completed on p. 67/68. This page references studies grouped into either *personal self care* (e.g., the Gast, et al., 1992 study that measured the effects of small group instruction, constant time delay and backward chaining on the acquisition of first aid skills in learners with significant cognitive delays); interventions designed to reduce stereotypic behaviors (e.g., the Frea, 1997 study, that reported the effects of the use of a sports watch and response prompting to increase in orienting to environmental stimuli in youth with autism); and finally, a single study measuring the effects of applied behavior analysis on the acquisition of indicating reinforcer preferences (Wacker, et al., 1985).

#### *Treatment Fidelity*

Several of the studies included in this review assessed and reported fidelity or integrity of treatment implementation. An exemplary description of how this was accomplished was given by Haring et al., (1995), in which 20% of treatment sessions were observed by two trained observers reporting a mean agreement of 93% with a range of 82% to 100% with a checklist for treatment fidelity. Additional debriefings were conducted with teachers implementing the treatment after all sessions that were not directly observed.

#### *Attrition Rates*

Since the majority of studies in this review employed single participant designs, attrition rates were generally nonexistent or unreported. Four of the studies employing between groups designs did report attrition rates (Fisher & Field, 1985; Hoge, et al, 1999; Lee & Tang, 1988; Westling, Floyd, & Carr, 1990). Overall attrition rates were typically low (less than or equal to 5%), with a few exceptions. For example, Fisher and Field (1985) reported a loss of 13% from their control group while Hoge, et al., (1999) reported a 23% loss from their control group; finally the Westling, et al, (1990) study reported the most significant attrition rates: 30% for their first group, and 20% for the second.

## Synthesis Findings

### *Introduction to the Analysis*

All average effect size calculations (meta-analyses) across multiple studies within each design classification were calculated using a fixed effects model and were tested for statistical significance using a z statistic:

$$z = \frac{|\overline{ES}|}{SE_{\overline{ES}}}$$

In addition, a  $Q$  statistic was calculated to test the homogeneity of the effect size distribution, again across all studies within each discrete design specification. The general formula for  $Q$  is given by Lipsey and Wilson, (2001, p.115-116):

$$Q = \sum w_i (ES_i - \overline{ES})^2$$

where  $ES_i$  is the individual effect size for  $i = 1$  to  $k$  (the number of effect sizes)

where  $\overline{ES}$  is the weighted mean effect size over the  $k$  effect sizes

where  $w_i$  is the individual weight for  $ES_i$

Our choice to use a fixed effects model was based on the assumption that a statistically significant  $Q$  statistic, while producing more variability than can be accounted for by subject-

level sampling error, can be explained by the systematic variation of the studies that generated the effect size. In order to further explore a statistically significant  $Q$  statistic, we selected an analogue variance ratio approach to calculating a metric for statistical significance. In this approach,  $Q$  is partitioned into a between groups component and a within groups component similar to an analysis of variance. While the number of variables that can be tested at one time is limited (similar to the problem of multiple  $t$  tests), we believed that this approach was the easiest to understand and explain to others.

Tables 4 and 5 present the meta-analytic results separately for the eight between groups studies and the 38 single participant studies in this review (since there were only three within subjects studies, we will only present and discuss the results of those in narrative). One effect size (Hedges  $g$ ) and accompanying weight (inverse variance method) were computed for each study. A weighted mean effect size was computed for both groups of studies, along with a  $z$ -statistic to test for statistical significance and a  $Q$ -statistic to evaluate for homogeneity of effect size estimates.

#### *Between Groups Design Studies*

As shown in Table 4, the mean effect size for the eight between groups studies was  $g = .90$  ( $z = 6.44$ ;  $p < .001$ ) with 95% confidence interval well above zero (lower = .63; upper = 1.18). These eight studies also were sufficiently homogeneous ( $Q = 5.87$ ;  $df = 7$ ) to produce a non-significant value ( $p > .55$ ). Despite this quite high average effect size (.90) and the homogeneity of effect size estimates, we find it very difficult to interpret the results of these eight studies. First, although these studies were all considered in the “transition” outcome area, there was marked variability in the types of curriculum and instruction delivered across these eight studies, and equally varied outcomes. Two of the studies focused on budgeting and finance skills; two focused on leisure and sporting skills; two were in the area of self-protection; and one

study each focused on sewing skills and convenience store shopping skills respectively. Too, only two of these studies (Cuvo et. al., 1991; Browning, 1985) used randomization, and a number of these studies reported less than optimal information associated with design or analytical validity. For example Westling et al. (1990) reported the use of a Wilcoxon matched pairs analysis, but there were unequal numbers in each group which seriously compromised the confidence in the effect size results. MacDonald et al. (1985) reported on the results of an intervention that was only one lesson plan of indeterminate length or intensity, and the Lee and Tang (1998) study was conducted in special schools for students with mental retardation in Hong Kong, and reported an intervention of only 90 minutes in length.

The three within subjects design studies do little to increase the interpretability of the between groups design studies. The Heal, et al. (1984) study and the McDonnell, et al. (1994) study both focused on community participation skills but came to strikingly different estimates of effects ( $g = .78$  and  $.16$  respectively). Finally, the Llewellyn and McLaughlin (1986) study focused on self-protection skills and was actually a multiple baseline study with 10 different subjects which allowed for an effect size to be calculated using a group design analytic process.

#### *Single Participant Design Studies*

Table 5 gives details of the 38 single participant studies. Not surprisingly, the meta-analysis of these studies produced an extremely high and statistically significant average effect size ( $g = 6.13$ ;  $z = 69.70$ ;  $p < .001$ ) with 95% confidence interval well above zero (lower = 5.96; upper = 6.30). Equally predictably, these 38 studies were extremely heterogeneous in the patterns of effect size variability ( $Q = 5690$ ;  $df = 36$ ;  $p < .001$ ), which seriously compromises the interpretability of the meta-analytic results. Even eliminating the quite obvious Wacker et al. (1985) outlier made no changes in the average effect size and confidence values, nor in the heterogeneity of the  $Q$  estimate since the actual effect size estimate of this study was quite small.

Given this heterogeneity of effect size estimates and the difficulty in interpreting the average effect size estimate against conventional rubrics (Cohen, 1988), what, if anything, can these single participant studies tell us in the aggregate? We believe the only substantive conclusions we can draw from these synthesis results are twofold:

1. Every single effect size for all 38 studies was positive.
2. Despite the fact that 23 of the 38 individual single participant studies had confidence intervals whose range spanned zero, the aggregated confidence interval for these 38 studies was actually very small and well above zero. These two conclusions suggest very cautious, but nonetheless positive, support for the efficacy of transition-related curricular interventions in single participant intervention contexts.

#### *Sensitivity Analyses*

The single-participant and one group pretest-posttest design studies do not lend themselves to sensitivity analyses due to the extreme instability of the effect size estimates in the single-participant studies, and the limited number of one-group pretest-posttest design studies. With respect to participant characteristics, the between groups studies were quite homogeneous on most characteristics such as gender, disability, and age range, again limiting the capacity for subgroup analyses.

#### *Rival Explanations*

Although it is certainly possible that a number of rival explanations, dispersed across the 50 studies in this review, could account for the effects found, it seems unlikely. The consistency of the results across all three design types (despite the instability of the effect size estimates in the single participant studies) reduces the probability of systematic or random error accounting for these findings.

## Conclusions

Various interventions designed to teach life skills do work, as is clear from the consistency of empirical evidence reviewed here. However, the state of the literature is such that few, if any, summative statements may be made. First, the studies vary widely in intervention focus, from budgeting to safety skills to using a headset to reduce stereotypic behaviors. Second, we are missing a number of well done studies with youth with milder disabilities, and for youth with more significant disabilities, the great majority of studies are single participant which are, as we have said, difficult to systematically compare in the aggregate. Finally, for all youth with disabilities, a discussion of the place of life skills instruction in a larger context is warranted, and is addressed in the next section.

## Implications for Practice

### *Should Life Skills Be Taught?*

Yes... but the answer is not so simple...

The intervention literature demonstrates a number of effective interventions for teaching functional life skills to youth with disabilities. It is also generally accepted that there is a link between life skills acquisition and life quality, although it is difficult to measure this empirically. “The essence of life skills acquisition cannot be weighed in terms of degrees, diplomas, or other documents; rather, it is demonstrated in their level of independent living, community adjustment, and enhanced quality of life” (Cronin, 1996, p. 53). Thus the relationship between life skills acquisition and life quality: when a person’s repertoire of various life skills increases, his or her independent functioning, social competence, and quality of life is also thought to increase.

The bulk of the empirical evidence has focused on students with more significant disabilities, specifically for students with moderate and severe disabilities, evidenced both in this

review, and in the other reviews cited in the introduction. For this population, though, there has been a documented shift away from life skills instruction (Nietupski & Hamre-Nietupski, 1997). In a comprehensive literature review, Nietupski and Hamre-Nietupski examined curricular research trends over a twenty year period (1976-1995) in selected special education journals in severe disabilities (moderate, severe, and profound mental retardation). They found an increase in articles with a life skills curricular focus from 1976-1985, but a steady decrease in the decade following, and a concomitant increase in the literature on social interaction, inclusion, and integration (p. 41).

Students with milder disabilities also have a purported need for life skills instruction (c.f. Cronin, 1996; Clark, et al., 1994). Outcome studies of youth with learning disabilities and developmental disabilities both show failed participation and satisfaction by young adults in multiple typical environments as they exit high school, and in the years following (e.g., Sitlington & Frank, 1993; Sitlington, et al., 1993; Wagner, et al., 1993) leading to the development of a *national position statement* on the imperative inclusion of life skills curricula for all students with disabilities (Clark, et al., 1994).

The inclusive education movement of the 1990's has undeniably produced a shift toward emphasis on the right to access regular education environments, and documentation of strategies to facilitate social inclusion, meaningful participation, and academic learning instead. Trends in general education have also likely influenced the shift away from life skills instruction, most markedly with the advent of the No Child Left Behind Act (NCLB) and the ratcheting up of the academic accountability movement. It might be argued that the national curricular focus for *all* students in secondary education has shifted almost exclusively toward academic achievement and college preparation.

This tension in secondary schooling – teaching youth with disabilities the skills needed to function in and succeed beyond school, versus including these same youth in general education classrooms where the curriculum is largely focused on academics – is as much a philosophical as it is a practical conundrum. We have learned much in recent years about the importance of community membership for youth with disabilities, and its critical contribution to life quality. Schwartz, Staub, Peck, and Gallucci (2006) have theorized that there is an interplay between community membership, interpersonal relationships, and skills development and acquisition--one that is difficult to measure empirically, but readily apparent to every educator and parent who has witnessed his or her student or child blossom in a skillfully facilitated inclusive educational setting. They contend that increased participation in valued roles, activities, and settings enhances life quality (Schwartz et al., 2006, p. 379).

We agree with a host of others (namely, Nietupski & Hamre-Nietupski, 1997; Cronin, 1996; Clark et al., 1994), that there is the need to balance instruction that facilitates belonging and community with explicit and careful instruction of skills needed once school ends – especially the explicit instruction of those skills needed but not already embedded or implicit in inclusive general education environments – or unable to be taught there with accommodations, modifications and other supports. Perhaps these goals are not as mutually exclusive as the evidence base on life skills instruction might indicate.

Halpern (1993; 1994b) argued that transition curricula be based on some balance between social norms and societal adult expectations on the one hand, and the personal preferences, needs, and choices of transition-aged youth on the other. This balance should then guide the development of both objective and subjective criteria for selecting what skills, methods and settings to teach secondary-aged youth with the goal being providing an individualized interpretation of, and promoting, life quality. Halpern grouped these conceptual criteria into

three general domains: (1) physical and material well-being; (2) performance of adult roles; and (3) personal fulfillment. Life skills instruction addresses each of these domains, especially with careful attention to *how and where* skills are taught; combined with the goals of inclusive, supported education, it also addresses community membership. Practitioners must ensure that the settings and methods utilized are not only effective in terms of instruction, but that they also enhance community membership and ultimately contribute to life quality.

#### *Do Interventions Designed to Teach Life Skills Work?*

Life skills may be effectively taught with various interventions. This judgment is based on consistently positive findings across well done between groups, single participant, and be-group studies. Yet the extent of the generalizeability of this conclusion must be interpreted cautiously, since the preponderance of studies have been completed with youth with more significant disabilities, and employ single participant designs, with their inherent challenges for synthesizing results across studies. There is a need for more evidence with interventions effectively measured with other research designs, as well as with students with milder disabilities. We also need to develop measures of concomitant gains like enhanced life quality and satisfaction for all students; and insofar as possible, empirically validate the relationship between life quality, community membership and belonging, personal preferences and adaptive functioning.

#### *How well do they work?*

Based on the evidence in this review, this question must also be answered cautiously. The between group designs had a quite high average effect size (.90), but because of the marked variability in the types of curriculum and instruction delivered across these eight studies, and equally varied outcomes, as well as the fact that a number of these studies reported less than optimal information associated with design or analytical validity (eroding the confidence which

may be placed in reported results) it is very difficult to interpret the results of these eight studies. The three studies employing within subjects design do little to increase the interpretability of the between groups design studies.

The single participant studies also varied widely in intervention and curricular outcome areas. What, if anything, do these single participant studies tell us in the aggregate? We believe the only substantive conclusions we can draw from these synthesis results are twofold:

1. Every single effect size for all 38 studies was positive.
2. Despite the fact that 23 of the 38 individual single participant studies had confidence intervals whose range spanned zero, the aggregated confidence interval for these 38 studies was actually very small and well above zero. These two conclusions suggest very cautious, but nonetheless positive, support for the efficacy of transition-related curricular interventions in single participant intervention contexts.

*How hard is it for youth to learn and use them?*

The fifty studies in this review also varied widely in the intensity and duration of interventions, from a single session, to many sessions per week over several months. For example, the MacDonald et al. (1985) study reported on the results of an intervention that was only one lesson plan of indeterminate length or intensity, and the Lee and Tang (1998) study reported an intervention of only 90 minutes in length, while the Branham et al. (1999) study, comparing videotape modeling, classroom simulation, and community-based instruction to teach cashing a check, mailing a letter, and crossing streets, took several weeks, with instruction provided one to three times per day, three times per week. Intervention length and intensity varied at least in part according to the skill being taught and the characteristics of the study participants; generally, for learners with moderate and severe disabilities, duration averaged between 12-50 sessions, over approximately 4 months (e.g., Trask-Tyler, et al., 1995, taught

cooking skills to students with visual and cognitive impairments over 40 sessions lasting 60-90 minutes per session) while generally fewer sessions were required for students with mild cognitive disabilities. For example, Mahon (1992) taught students with mild mental retardation to make informed leisure decisions in 9-12 sessions.

*Do they work equally well for different kinds of youth and settings?*

Acknowledging the differences reported above in intensity and duration of interventions, as well as the fact that the majority of evidence has been established with students with moderate and severe disabilities, the studies analyzed here indicate that with carefully planned and implemented instruction, *all* students with disabilities are able to acquire various functional life skills. This question, however, begs discussion of alignment of interventions to commonly-held, accepted practices in special education; simply put, the quality of the instructional setting matters. For example, Zhang, et al. (1995) reportedly taught recreation skills to adolescents living in a residential institution; our reviewers felt that the study setting raised serious questions about ecological validity. While the skills selected for instruction did represent "functional life skills" in the "recreation domain", they were approximated skills taught in the gymnasium of a residential institution, instead of in the community. We would argue that this instructional setting has completely different cues available, and question whether a) the skills taught would generalize to the natural environment, and b) the participants will ever have a chance to use the targeted skills again. Also, the task analyses used were not individualized for each student, and no attempts to select skills that participants wanted to learn were reported. We also questioned whether the use of some settings and cues may have led to enhanced, or unintended deleterious effects, such as the Branham et al. (1999) study, which reportedly used peer tutors to act as passing cars in school hallways while enacting street crossing. Conversely, many of the studies in this review did score well on measures of ecological validity, such as those reporting

maintenance and generalization measures. The Haring, et al. (1987) study which taught purchasing skills to adolescents with severe disabilities in multiple community settings is an example.

*How long should you implement instruction?*

We have no empirically tested evidence that would confirm a minimum recommendation for length and intensity of a life skills intervention. Almost all of the best evidence studies cited directly below were offered over a duration of approximately 3- 4 months, and at an intensity level of, typically, a few times per week.

*What is the best evidence?*

Given the variability of interventions and outcomes associated with this review, there is no single piece which represents the “best evidence” (Slavin, 1986) to teach functional life skills to youth with disabilities. However, there are several studies we can recommend that are exemplary with regard to the curricular areas depicted in Table 3. These are studies which met *better than adequate research quality standards* in almost every area evaluated.

To teach money skills to adolescents with mild disabilities, we recommend the Cuvo et al. (1991) study. The authors taught students the use of a savings account, money order, and bill paying through use of a self-paced workbook. The Denny and Test (1995) study represents a high quality intervention for teaching a “one more than” or “dollar up” bill counting strategy to youth with moderate disabilities. For teaching generalized purchasing skills to adolescents with moderate - severe cognitive disabilities, we recommend the Haring et al. (1995) study, which examined the effectiveness of videotape modeling combined with in vivo training to teach students to make purchases in a variety of stores in the community. Likewise, the Mechling et al. (2002) study is also high quality on most measures. These researchers taught youth with moderate cognitive disabilities to use aisle signs to locate items in stores.

The Vandercook (1991) study is an exemplary work which focuses on leisure skills instruction for students with severe intellectual disabilities; students were accompanied by peers without disabilities and were taught bowling and pinball skills in the community. Regarding leisure skills *awareness* for students with mild disabilities, we recommend Hoge et al.(1999), despite their use of non-equivalent comparison groups. Students in the experimental group participated in a leisure education program that included an 18-week course, systematic community instruction and support from a leisure coach, and family/friend involvement, with resultant significant gains on a number of leisure skills measures.

We recommend too the Domaracki and Lyon (1992) study, which measured the effects of prompting and task analysis to teach housekeeping and janitorial work skills to adolescents with moderate-severe mental retardation. Also to teach cleaning skills, we recommend the Cuvo et al. (1992) study, which measured the effects of response prompting to teach cleaning and laundry skills to youth with mild disabilities. For an exemplary study focused on cooking/meal preparation, we recommend the Arnold-Reid et al. (1997) study. In this study, researchers taught meal planning *and* preparation to youth with mental retardation, with careful attention to nutritional content. The studies with interventions designed to reduce stereotypic/ aberrant behaviors in this review had a very small *n*, as well as very idiosyncratic topics, and therefore have limited applicability to others. That said, our final recommendation (a nod to “best evidence” in this area) is the Frea (1997) study, which documented the effectiveness of the use of an auditory cue delivered through headphones to decrease the stereotypic behavior of two adolescent males with autism and increase orienting responses to their environment.

## Limitations

There are several limitations inherent in this review. Some are pertinent to review work in general; some are unique to review work in special education; and some are unique to our particular review.

A common criticism of review work is the possibility of the existence of “file drawer” or “fugitive” literature not captured in our (and those of other reviewers) literature search parameters, as well as “publication bias”-- the tendency of journals to publish only studies with reported positive results (Hunt, 1997). Second, evaluating the quality of research and calculating meta-analyses represent both a strength and a limitation in our review (at least theoretically); that is, our inclusionary criteria inadvertently excluded a sizeable body of literature due to a lack of reported data sufficient to calculate effect sizes. The scope of our work prevented us from contacting individual authors to request such data.

Third, the lack of a well-established mechanism for calculating effect sizes in single participant designs remains an unresolved and important issue in special education meta-analysis (c.f. Campbell, 2004; Guskin, 1984) – especially pertinent here as the majority of available evidence in life skills intervention research employs single participant designs. As well, the great majority of the multiple baseline studies were also missing information on the random assignment of participants, tasks, or settings in determining order, which also deterred from overall quality estimates.

Fourth, we have mentioned that more evidence exists with students labeled with more significant cognitive disabilities, yet have presented a theoretical case on the importance of life skills instruction for *all* students with disabilities. We need more research analyzing the efficacy of various interventions with youth with milder disabilities.

Finally, and this is peculiar to our review – the interventions and outcomes described herein vary enormously. We were constrained by the parameters of our original research grant to address both intervention and outcome areas. We also wanted our work to be useful to practitioners and others who might not readily search for results by such intervention terms as “response prompting” or “direct instruction” and so organized our work by both curricular areas and interventions. However, the heterogeneity of the resultant body of work rendered the synthesis somewhat less interpretable, and certainly made the task more challenging.

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Table 1

*Design Standards for Quantitative, Single Participant, & Qualitative Studies*

		<b>Rubric Used to Evaluate the Evidence Found in the Group</b>			
		<b>Quantitative Studies</b>			
	<b>Questions</b>	<b>Yes Rating</b>	<b>Maybe Yes Rating</b>	<b>Maybe No Rating</b>	<b>No Rating</b>
<b>DIAD Internal Validity Standards</b>	How would you rate the alignment of the intervention to commonly-held ideas of the intervention or approach?	Yes, the intervention or approach fully reflected commonly-held or theoretically derived ideas about what the intervention or approach should be.	Maybe yes, at a minimum the intervention or approach at least somewhat reflected commonly-held or theoretically derived ideas about what the intervention or approach should be.	Maybe no, the intervention or approach was described only as member of broader classes (across which significant variation in content can be expected).	No, the intervention or approach did not reflect commonly-held or theoretically derived ideas about what it should be.
	How would you rate the implementation and replicability of the intervention or approach?	Yes, the intervention or approach was sufficiently described at a level which would allow relatively easy and thorough replication by other implementers, and the description of the implementation of intervention was fully consistent with its defined characteristics.	Maybe yes, the intervention or approach adequately described to allow replication of the most essential elements by other implementers, and the description of the implementation was largely consistent with its defined characteristics.	Maybe no, the authors of the study omit important descriptive information concerning the essential elements of the intervention such that its replication would be impossible, OR it is plausible that the implementation of the intervention may well have been inconsistent with its defined characteristics.	No, the authors of the study omit important descriptive information concerning the essential elements of the intervention such that its replication would be impossible, AND it is plausible that the implementation of the intervention may well have been inconsistent with its defined characteristics
	How would you rate the adequacy with which the outcome measure was defined?	Yes, the study provided adequate evidence that the outcome measure was properly defined and appropriate for the context of the study.	Maybe yes, although the study did not present adequate evidence that the outcome measure was properly defined but the measure did appear to be appropriate to the content of the outcome and the context of the study.	Maybe no, the outcome and/or the measure used to assess the outcome were only described conceptually as a member of a broader class of outcomes/measures about which significant variation exists as to their specific content.	No, it is unclear what the outcome is and how it was measured.
	How would you rate the adequacy with which participants in the comparison or alternative treatment group(s) were made comparable to those in the treatment group?	Yes, participants were randomly assigned to conditions, and there does not appear to have been any serious differential attrition within groups or severe overall attrition across groups.	Maybe yes, EITHER randomized assignment was used but there appears to have been serious differential attrition within groups or serious overall attrition across groups, OR although random assignment of participants to groups was not used, there does not appear to have been serious attrition problems within or across groups and reasonable attempts were made to make the groups comparable (i.e. matched sampling, use of a covariate, etc.).	Maybe no, randomized assignment was not used and despite some steps taken to make the groups comparable, they do not appear to have been adequate.	No, it is unlikely or unknown that/if the participants in the groups are comparable.

		<b>Rubric Used to Evaluate the Evidence Found in the Group Quantitative Studies</b>			
<b>DIAD External Validity Standards</b>	How would you rate the adequacy with which events that happened concurrently with the intervention or approach that might have confused its effect were controlled?	Yes, concurrent processes and events that might be alternative explanations to a treatment effect have been ruled out, either explicitly or implicitly.	Maybe yes, there were no identified processes or events that could be alternative explanations for a treatment effect, but some alternative explanations cannot be explicitly ruled out either because there was some evidence that alternative explanations might exist, or because no attention was given to ruling out an alternative explanation and it is reasonable to expect that one or more alternative explanations might exist.	There is no "Maybe No" rating for this standard	No, identifiable processes or events that are described to be occurring simultaneously with the treatment or approach may have caused the observed effect.
	How broadly was the intervention tested statistically across important sub-groups of students, and across substantive variations within the intervention as a whole?	Yes, the analyses in the study examined the effect(s) of the intervention across important sub-groups of students AND included separate analyses of key sub-components of the intervention for differential effectiveness on those different sub-groups of students.	Maybe yes, some sub-group analyses were conducted AND some estimates were made exploring differential effects of different intervention components.	Maybe no, some sub-group analyses were conducted OR some estimates were made exploring differential effects of different intervention components. However, significant sub-groups were omitted from the analyses, and no separate effects of different intervention components by sub-groups were explored.	No, only main effects for the intervention as a whole were reported with no sub-group or intervention component analyses.
	How thoroughly were the assumptions underlying the statistical analyses for the study reported?	Yes, it is clear from the design that the assumption of independence across groups and observations was not violated, and some evidence is provided that other important assumptions underlying the statistics for the study (i.e. homogeneity of variance) were not violated.	Maybe yes, it is clear that the assumption of independence across groups and observations was not violated, but other information about assumptions underlying the statistics for the study is not provided.	Maybe no, it appears that the assumption of independence across groups or observations was likely to be met and other information about assumptions underlying the statistics for the study are not provided.	No, it does not appear from the study's design that the assumption of independence across groups or observations was met.
	How adequately were the data described, analyzed, and depicted such that effect size for the outcome in this extraction is able to be calculated?	Yes, either the effect size was reported by the authors or they provided data to allow precise calculation of effect sizes.	Maybe yes, sufficient statistical information was reported to allow, at a minimum, an imprecise effect size to be calculated for the outcome of this extraction.	Not Applicable	No, neither sample sizes nor effect sizes were reported, and insufficient data were provided to allow those effect sizes to be calculated.

<b>Rubric Used to Evaluate the Evidence Found in the Single Participant Studies</b>					
	<b>Questions</b>	<b>“Yes” Rating</b>	<b>“Maybe Yes” Rating</b>	<b>“Maybe No” Rating</b>	<b>“No” Rating</b>
<b>DIAD Internal Validity Standards</b>	<p>How would you rate the alignment of the intervention to commonly-held ideas of the intervention or approach?</p> <p>How would you rate the implementation and replicability of the intervention or approach?</p>	<p>Yes, the intervention or approach fully reflected commonly-held or theoretically derived ideas about what the intervention or approach should be.</p> <p>Yes, the intervention or approach was sufficiently described at a level which would allow relatively easy and thorough replication by other implementers, and the description of the implementation of intervention was fully consistent with its defined characteristics.</p>	<p>Maybe yes, at a minimum the intervention or approach at least somewhat reflected commonly-held or theoretically derived ideas about what the intervention or approach should be.</p> <p>Maybe yes, the intervention or approach adequately described to allow replication of the most essential elements by other implementers, and the description of the implementation was largely consistent with its defined characteristics.</p>	<p>Maybe no, the intervention or approach was described only as member of broader classes (across which significant variation in content can be expected).</p> <p>Maybe no, the authors of the study omit important descriptive information concerning the essential elements of the intervention such that its replication would be impossible, OR it is plausible that the implementation of the intervention may well have been inconsistent with its defined characteristics.</p>	<p>No, the intervention or approach did not reflect commonly-held or theoretically derived ideas about what it should be.</p> <p>No, the authors of the study omit important descriptive information concerning the essential elements of the intervention such that its replication would be impossible, AND it is plausible that the implementation of the intervention may well have been inconsistent with its defined characteristics</p>
	<p>How would you rate the reliability of the observable behaviors?</p>	<p>Yes, observers are blind to the research questions, condition and expected outcomes; behavior is measured with a quantifiable index; and interrater reliability has been established.</p>	<p>Maybe yes, behavior is measured with a quantifiable index and interrater reliability has been established.</p>	<p>Not Applicable</p>	<p>No, behavior is not measured with a quantifiable index and interrater reliability has not been established.</p>
	<p>How would you rate the process by which participants in the study were selected?</p>	<p>Yes, screening procedures were described including demographic information, assessment procedures and physical setting.</p>	<p>Maybe yes, screening procedures were described including demographic information and physical setting.</p>	<p>Not Applicable</p>	<p>No, participants and/or context are not described to the extent that replication can take place.</p>

<b>Rubric Used to Evaluate the Evidence Found in the Single Participant Studies</b>					
	<b>Questions</b>	<b>“Yes” Rating</b>	<b>“Maybe Yes” Rating</b>	<b>“Maybe No” Rating</b>	<b>“No” Rating</b>
<b>DIAD External Validity Standards</b>	How would you rate the adequacy with which events that happened concurrently with the intervention or approach that might have confused its effect were controlled?	Yes, concurrent processes and events that might be alternative explanations to a treatment effect have been ruled out through the use of one or more of the following design elements:  a) number of reversals b) number of sessions prior to reversals c) level of baseline prior to reversal d) random assignment of participants in multiple baseline across subjects designs	Maybe yes, although one or more of the following design elements was/were used in the study, the fidelity with which it/they were implemented is unclear enough such that alternative explanations for the treatment effect cannot be explicitly ruled out:  a) number of reversals b) number of sessions prior to reversals c) level of baseline prior to reversal d) random assignment of participants in multiple baseline across subjects designs	Not Applicable	No, none of the following design elements was/were used in the study:  a) number of reversals b) number of sessions prior to reversals c) level of baseline prior to reversal d) random assignment of participants in multiple baseline across subjects designs
	How broadly was the intervention tested statistically across important sub-groups of students, and across substantive variations within the intervention as a whole?	Yes, the analyses in the study examined the effect(s) of the intervention across important sub-groups of students AND included separate analyses of key sub-components of the intervention for differential effectiveness on those different sub-groups of students.	Maybe yes, some sub-group analyses were conducted AND some estimates were made exploring differential effects of different intervention components.	Maybe no, some sub-group analyses were conducted OR some estimates were made exploring differential effects of different intervention components. However, significant sub-groups were omitted from the analyses, and no separate effects of different intervention components by sub-groups were explored.	No, only main effects for the intervention as a whole were reported with no sub-group or intervention component analyses.
	How thoroughly were the assumptions underlying the statistical analyses for the study reported?	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	How adequately were the data described, analyzed, and depicted such that effect size for the outcome in this extraction is able to be calculated?	Yes, either the effect size was reported by the authors or they provided data to allow precise calculation of effect sizes.	Maybe yes, sufficient statistical information was reported to allow, at a minimum, an imprecise effect size to be calculated for the outcome of this extraction.	Not Applicable	No, neither sample sizes nor effect sizes were reported, and insufficient data were provided to allow those effect sizes to be calculated.
	Could a visual analysis be performed?	Yes, the graphic display allows serial dependency to be examined (and removed if appropriate).	Maybe yes, the graphic display provides an overall description but too crude to allow serial dependency to be examined/removed.		No, the graphic display does not allow for a visual analysis to be performed.

		<b>Rubric Used to Evaluate the Evidence Found in the Qualitative Studies</b>			
	<b>Questions</b>	<b>Yes Rating</b>	<b>Maybe Yes Rating</b>	<b>Maybe No Rating</b>	<b>No Rating</b>
<b>DIAD Internal Validity Standards</b>	How would you rate the construct validity of the intervention or approach?	Yes, a rich, thick description of phenomenon and/or intervention, and the “network” of literature associated with it was provided by the author(s) of the study.	Maybe yes, at a minimum, a reasonably adequate description of phenomenon/ intervention was provided, along with a modest treatment of the “network” of literature associated with it.	Maybe no, the intervention or approach was described only in a cursory manner; little or no attempt was made by the author(s) to describe how the phenomenon/ intervention was embedded in a “network” of literature.	No, it is unclear what the phenomenon/ intervention was, nor was there any attempt by the author(s) to describe how the phenomenon/ intervention was embedded in a “network” of literature.
	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	How would you rate the adequacy with which the rationale was made for how the participants in the study were selected?	Yes, an adequate justification was made for the sampling strategy used in the study, AND it appears to have been implemented in a manner consistent with commonly-held norms for that sampling strategy.	Maybe yes, very little rationale is given for the particular sampling strategy but it appears to have been implemented in a manner consistent with commonly-held norms for that sampling strategy OR a reasonably well-made rationale was provided by the study authors for the sampling strategy but it does not appear to have been implemented adequately or appropriately	Maybe no, although some rationale or description of the sampling strategy was provided, they do not appear to have been appropriately conceptualized or implemented.	No, it is unclear what the sampling strategy was or how it was implemented.
	How would you rate the adequacy with which design techniques were used to establish the credibility of the study?	Yes, evidence of internal consistency and reasonably adequate descriptions of at least two more of the following design elements were provided:  Triangulation Reflexivity Prolonged field experience Member checking Peer examination Negative case analysis Clarifying researcher bias External audit Audit trail Rich, thick description Code-recode Nominated sample Compare sample to demographic data Dense description of sample	Maybe Yes, evidence of internal consistency and reasonably adequate descriptions of at least one more of the following design elements were provided:  Triangulation Reflexivity Prolonged field experience Member checking Peer examination Negative case analysis Clarifying researcher bias External audit Audit trail Rich, thick description Code-recode Nominated sample Compare sample to demographic data Dense description of sample	Not Applicable	No, the study presents no evidence of internal consistency, regardless of the fact that evidence of one or more of the following design elements were provided:  Triangulation Reflexivity Prolonged field experience Member checking Peer examination Negative case analysis Clarifying researcher bias External audit Audit trail Rich, thick description Code-recode Nominated sample Compare sample to demographic data Dense description of sample

		<b>Rubric Used to Evaluate the Evidence Found in the Qualitative Studies</b>			
<b>DIAD External Validity Standards</b>	How would you rate the transferability of the study?	Yes, adequately “dense” descriptions of the sample and sampling context were given and sampling data were reported indicating the characteristics of the specific participants being studied were aligned with the demographics of this review.	Maybe yes, although some “dense” information was omitted on the sample and sampling context, sampling data were adequately reported indicating the characteristics of the specific participants being studied were aligned with the demographics of this review.	Maybe no, although most “dense” sample and sampling contextual information were omitted from this study, sampling data were adequately reported indicating the characteristics of the specific participants being studied were aligned with the demographics of this review.	No, the study does not adequately clarify the sample and sampling context such that it is clear that the targeted participants were youth with disabilities aged 12 – 22 or the setting is germane to this review.
	How would you rate the transparency of the data analysis strategy(s)?	Yes, reasonably adequate descriptions of the following data analysis strategies were provided such that the credibility of the study is enhanced: a. Quasi-statistical b. Deductive strategy c. Inductive strategy d. Thematic/Holistic strategy.	Maybe yes, although one or more of the following data analysis was/were used in the study, the fidelity with which it/they were implemented is unclear enough such that the credibility of the study cannot be explicitly affirmed: a. Quasi-statistical b. Deductive strategy c. Inductive strategy d. Thematic/Holistic strategy.	Not Applicable	No, none of the following data analysis strategy was/were used in the study: a. Quasi-statistical b. Deductive strategy c. Inductive strategy d. Thematic/Holistic strategy
	How would you rate the transparency of the data collection and methods?	Yes, reasonably adequate descriptions of the data collection and methods were provided.	Maybe yes, some description of the data collection and methods was provided.	Maybe no, although some description of the data collection and methods was provided, it was incomplete and lacking adequate detail.	No, description of the data collection and methods was provided.

Table 2

*Sample, Setting and Participant Characteristics of the 49 Studies*

Study	Sample Size	Setting	Participant Characteristics		
			Disability label	Average Age in years or Grade Level (when noted)	Percent female
Aeschleman & Gedig (1985)	3	Residential facility	Mild MR	16.67	67%
Arnold-Reid, Schloss, & Alper (1997)	3	Community - based group home	Moderate MR	16.67	0%
Branham, Collins, Schuster, & Kleinert (1999)	3	Special ed. classroom in typical, rural high school and community locations	Moderate-severe MR	16	33%
Browning (1985)	26	Vocational center	MH (multiple handicaps)	17.3	46%
Collins, Hall, & Branson (1997)	4	Rural, secondary self-contained special ed. class	Moderate MR	15-19	50%
Collins, Stinson, & Land (1993)	3	Community adjacent to school	Moderate disabilities: autism, hearing impairment, MR	17.8	50%
Cuvo, Davis, & Gluck (1991)	20	Classrooms at residential rehabilitation facility, sheltered workshop & HS	Mild MR & LD	20	No gender information given
Cuvo, Davis, O'Reilly, Mooney, & Crowley (1992)	4/11	Various locations in rehabilitation facility	Mild disabilities	Young adults	No gender information given
Denny & Test (1995)	3	School's library	Moderate MR	17	67%
Domaracki & Lyon (1992)	4	Sheltered workshop	Moderate & severe MR	Young adults	25%
Dunn, Cunningham, & Backman (1998)	1	Clinic setting and later at school	CP & Mild MR	16	0%

Study	Sample Size	Setting	Participant Characteristics		
			Disability label	Average Age in years or Grade Level (when noted)	Percent female
Evans, Evans, Schmid, & Pennypacker (1985)	6	Resource room and school track	Behavior Disordered (BD)	13	No gender information given
Fisher & Field (1985)	79 (59 in treatment group and 20 in control group)	Classrooms in self-contained school for students with cognitive disabilities	Mild or moderate MR or multiple disabilities	11-21	42% for treatment group (no information provided on control group)
Frea (1997)	2	Community: parks, neighborhood, shopping mall	Autism	19	0%
Gast, Winterling, Wolery, & Farmer (1992)	4	Self-contained special ed. rm. in typical rural HS	Moderate – severe MR	19.25	50%
Gumpel & Nativ-Ari-Am (2001) Study 1	2	Ss attended special school in Israel; study conducted in randomly selected grocery stores	Visual & cognitive impairments	18	50%
Gunter, Fox, McEvoy, Shores, & Denny (1993)	1	Typical ES w/ separate wing for children with autism	Autism	14	0%
Haring, Breen, Weiner, & Kennedy (1995)	3/6 eligible	Assorted stores in community, Ss' homes, and university setting	Moderate-severe disabilities (autism & MR)	10-16	50%
Haring, Kennedy, Adams, & Pitts-Conway (1987)	3	School library & one student's home	Autism and MR	20	33%
Hastings, Raymond, & McLaughlin (1989)	7	Resource rooms in Canadian HSs	Mild-moderate MR & LD	16.57	14%

Study	Sample Size	Setting	Participant Characteristics		
			Disability label	Average Age in years or Grade Level (when noted)	Percent female
Heal, Colson, & Gross (1984)	21	Apartment owned by HS, used for instruction	Severe MR	16-21	No gender information given
Hoge, Dattilo, & Williams (1999)	34 (18 in experimental group; 16 in comparison group)	Self-contained special education classrooms in many high schools	Mild cognitive disabilities	16.6	42.1% (experimental group) 60% (comparison group)
Horsfall & Maggs (1986)	3	Residential/ day school for Ss with mild disabilities	Blind & MR	15	67%
Johnson, Hunt, & Siebert (1994)	2	Hospital setting	Severe – profound MR	14	0%
Keogh, Faw, Whitman, & Reid (1984)	4	State facility for persons with dev. disabilities	Severe MR	17	0%
Lagomarcino, Reid, Ivancic, & Faw (1984)	5	Institution and community building owned by ARC	Severe – profound MR	14-19	0%
Lee & Tang (1988)	72	Special schools for children w/MR in Hong Kong	Mild MR	13.44	100%
Llewellyn & McLaughlin (1986)	10	Setting information not specified	Mild MR and LD	13-15	50%
MacDonald, Manning, & Souther (1985)	12	Home economics class at School for the Blind	Blind	13.7	No gender information given
Mahon & Bullock (1992)	3	Self-contained special ed. Classroom	Mild-moderate MR	15	67%
McDonnell, Hardman, Hightower, Keifer-	34	Special ed. classrooms at typical high schools	Moderate – profound MR	18.1	No gender information given

Study	Sample Size	Setting	Participant Characteristics		
			Disability label	Average Age in years or Grade Level (when noted)	Percent female
O'Donnell, & Drew (1993)					
McGill & Vogtle (2001)	11	Interviews typically conducted in Ss' homes	Physical disabilities	High-school age	27%
Mechling, Gast, & Langone (2002)	3	Private school for youth with disabilities	Moderate MR & CP	14.67	100%
Miller & Test (1989)	4	School's laundry rooms	Moderate MR	18	75%
Nietupski, Hamre-Nietupski, Green, Varnum-Teeter, Twedt, LePera, Scebold, & Hanrahan (1986)	3	Self-contained special ed. classrooms, break room, or domestic living site used by special ed. program	Moderate-severe MR	17.33	33%
Ninot, Bilard, Delignieres, & Sokolowski (2000)	16	Special ed. classes in four French segregated schools	MR	15.7	100%
O'Conner & Cuvo (1989)	3	Two locations in rehab. facility, & university rec. center	Mild MR	17.33	66%
Schloss, Alper, Young, Arnold-Reid, Aylward, & Dudenhoeffer (1995)	2	Group home and selected rec. sites in community,	Mild MR	14	0%
Smith, Collins, Schuster, & Kleinert (1999)	4	Special education classroom	Moderate – severe MR	17.12	50%
Test, Howell, Burkhart, & Beroth (1993)	3	School library at special ed. school	Moderate MR	16	33%

Study	Sample Size	Setting	Participant Characteristics		
			Disability label	Average Age in years or Grade Level (when noted)	Percent female
Trask-Tyler, Grossi, & Heward (1995)	3	State school for students with visual impairments	Mild- moderate MR and visual impairments	19.33	33%
Ulicny, Adler, & Jones (1990)	3	Classroom in residential treatment center	Physical disabilities (CP and ABI) and mild MR	18.67	33%
Vandercook (1991)	5	Bowling alley in community	Multiple disabilities: physical, sensory plus cognitive	19	60%
Wacker, Berg, Wiggins, Muldoon, & Cavanaugh (1985)	5	Two self-contained classrooms at high school	Profound MR	14.2	80%
Wall, Gast, & Royston (1999)	3	Self-contained special ed classrooms at rural public high school	Severe-profound MR	19 years, 11 months- 21 years, 10 months	0%
Westling, Floyd, & Carr (1990)	15	3/10 for group 1 (single setting) and 2/10 for group 2 (multiple settings)	Moderate MR	13 – 21	27%
Winterling, Gast, Wolery, & Farmer (1992)	3	Kitchen in Home Ec. Rm. in integrated, rural HS	Moderate MR	17-21	33%
Wissick, Lloyd, & Kinzie (1992)	3	Training: small rural HS; probes conducted in stores	Moderate-severe disabilities	14.67	33.3%
Zetts, Horvat, & Langone (1995)	6	Fitness center in community and school gymnasium	Moderate – severe MR	17.45	33%

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Study	Sample Size	Setting	Participant Characteristics		
			Disability label	Average Age in years or Grade Level (when noted)	Percent female
Zhang, Gast, Horvat, & Dattilo (1995)	4	Gymnasium at residential institution	Severe-profound MR	17.67	25%

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Table 3

*Life Skills Curricular Areas*

Curricular areas	Studies	Designs	Intervention features	Outcome features
Money skills Budgeting (5)	Aeschleman & Gedig (1985)	Single participant (2): <i>MB x participants or settings</i>	Banking skills instruction (slides, modeling, prompting [task analysis] and differential feedback)	Acquisition of basic banking transaction skills: depositing checks and cash and withdrawing cash, to/from savings and checking accounts.  Acquisition of basic budgeting and money management skills, e.g., paying bills.
	Branham, Collins, Schuster, & Kleinert (1999)	Between groups (2): <i>posttest only control group designs</i>	Budgeting instruction (computer assisted instruction [CAI] and workbooks)	
	Browning (1985)	Within subjects design (1): <i>Crossover</i>		
	Cuvo, Davis, & Gluck (1991)			
	Heal, Colson, & Gross (1984)			
Money skills Dollar up (or one more than) strategy (2)	Denny & Test (1995)	Single participant designs (2): <i>MB x participants or tasks</i>	Modeling, practice, and praise—different bill denominations/“cents pile modification”	Acquisition & generalization of paying for purchases with cash
	Test, Howell, Burkhart, & Beroth (1993)			
Money skills Speed counting bills and change (1)	Hastings, Raymond, & McLaughlin (1989)	Single participant design (1): <i>MB x participants</i>	Direct instruction to count bills and coins: Tens number line used to assist with accuracy.	Ability to count bills and coins in stores while making a purchase.
Money skills Purchasing (8)	Gumpel & Nativ-Ari-Am (2001) (2)	Single participant design (5): <i>MB x participants; (1) MB x settings and participants</i>	General case programming and task analysis (least-to-most intrusive prompt system) to teach locating and purchasing items in a grocery store (4)	Acquisition and generalization of shopping skills
	Westling, Floyd, & Carr (1990)	Between groups designs (1): <i>Pretest-posttest control group design</i>	Using videodisc or videotape modeling, with probes/practice in real stores (4).	
	Heal, Colson, & Gross (1984)			
	Haring, Kennedy, Adams, & Pitts-Conway (1987)	Within subjects design (1): <i>Crossover</i>		

Curricular areas	Studies	Designs	Intervention features	Outcome features
	Haring, Breen, Weiner, & Kennedy (1995)			
	Wissick, Lloyd, & Kinzie (1992)			
	Mechling, Gast, & Langone (2002)			
Crossing streets (2)	Branham, Collins, Schuster, & Kleinert (1999)	Single participant designs (2): <i>MB x settings, and MB x participants</i>	Constant time delay or progressive time delay & task analysis.	Acquisition of street crossing skills
	Collins, Stinson, & Land (1993)			
General (& assorted) Community-Based Instruction (CBI) (3)	Schloss, Alper, Young, Arnold-Reid, Aylward, & Dudenhoefter (1995)	Single participant design (1) <i>MB x settings with a replication.</i>	First study taught functional sight words in community contexts (prompt/fade); second interviewed students regarding their perceptions of inclusion in or exclusion from Driver's Ed classes; third incorporated instruction on variety of community skills	Recognition of functional sight words/ follow directions in rec. settings; various perceptions & themes about driving; Acquisition of functional community living skills
	McGill & Vogtle (2001)	Qualitative (1)		
	Heal, Colson, & Gross (1984)	Between groups design: <i>Crossover</i> (1)		
Self-Protection Curricula (3)	Fisher & Field (1985)	Between groups (2) <i>Pretest-posttest control group design; Pretest-posttest non-equivalent comparison group design</i>	Skills taught through pictures/discussion, modeling, behavioral rehearsal, shaping, social reinforcement, and feedback.	Acquisition of specific self-protection skills.
	Lee & Tang (1988)			
	Llewellyn & McLaughlin (1986)	Within subjects (1) <i>Single group pretest-posttest design</i>		

Curricular areas	Studies	Designs	Intervention features	Outcome features
Leisure Skills Games/activities(5)	Collins, Hall, & Branson (1997)	Single participant designs (5): <i>MB x tasks with replications across participants (3);</i>	Task analysis with system of least prompts and differential feedback to teach playing games, viewing a TV program or video; also choice training intervention, praise for sustaining leisure activity.	Acquisition of game skills; choice making; increase in competence and social interactions at bowling alley.
	Keogh, Faw, Whitman, & Reid (1984)	<i>MB x participants (2)</i>		
	Nietupski, et al. (1986)			
	Wall, Gast, & Royston (1999)			
	Vandercook (1991)			
Leisure Skills Exercise, weights, sports participation (6)	Lagomarcino, Reid, Ivancic, & Faw (1984)	Single participant designs (5): <i>MB x participants (3);</i>	Various instructional strategies to teach dance skills (Dancercise and dance steps); strength training (weights); jogging; swimming; simulated bowling, overhand throwing and short distance putting	Acquisition of leisure & various sports skills; performance in aerobics classes in community; increase in ability to lift and move boxes; vigorous exercise associated with reduction in problem behaviors and increase in on task behaviors.
	O'Conner & Cuvo (1989)	<i>MB x tasks w/ replications across participants; reversal design</i>		
	Zetts, Horvat, & Langone (1995)	Between groups design (1): <i>pretest-posttest non-equivalent comparison group design</i>		
	Evans, Evans, Schmid, & Pennypacker (1985)			
	Ninot, Bilard, Delignieres, & Sokolowski (2000)			
	Zhang, Gast, Horvat, & Dattilo (1995)			
Leisure Skills Awareness & Education Curricula(2)	Hoge, Dattilo, & Williams (1999)	Single participant design (1): <i>MB x participants .</i>	Leisure education curricula	Increase in <i>perceived freedom</i> as leisure skills acquired.
	Mahon & Bullock (1992)	Between groups design (1): <i>Pretest-posttest non-equivalent comparison group design;</i>		

Curricular areas	Studies	Designs	Intervention features	Outcome features
Homekeeping Skills (5)	Domaracki & Lyon (1992)  Smith, Collins, Schuster, & Kleinert (1999)  Heal, Colson, & Gross (1984)  Cuvo, Davis, O'Reilly, Mooney, & Crowley (1992)  Winterling, Gast, Wolery, & Farmer (1992)	Single participant designs (4): <i>MB x behaviors, with repetitions x participants (2); MB x participants (2)</i> .  Within subjects design: <i>Crossover (1)</i>	Task analyses and system of least prompts with differential feedback to facilitate learning various homekeeping tasks (cleaning, safety skills-removing glass shards from sink, etc.)	Acquisition of housekeeping skills.
Cooking/ meal preparation (3)	.Horsfall & Maggs (1986)  Trask-Tyler, Grossi, & Heward (1995)  Arnold-Reid, Schloss, & Alper (1997)	Single participant design(3): <i>MB x participants (2); MB x tasks (1)</i>	System of least prompts, task analysis and concurrent instruction on all steps to prepare simple recipes with verbal or tape-recorded instructions.  Arnold-Reid, et al. also taught Ss to fill out and follow charts using RDA guidelines for meals and snacks.	Acquisition of simple meal prep skills; generalization to untrained recipes; acquisition of meal planning skills w/ attention to meeting nutritional needs; increase in nutritional content of meals consumed.
Laundry skills (1))	Miller & Test (1989)	Single participant design: <i>multi-element, alternating treatments</i>	Most-to-least prompting strategy and constant time delay (0 sec., then 2 sec.) were used to teach <u>laundry skills</u> (treatments counterbalanced across students and machines).	Acquisition of laundry skills with both interventions: constant time delay more efficient in terms of instructional time with fewer errors.

Curricular areas	Studies	Designs	Intervention features	Outcome features
Sewing machine use (1)	MacDonald, Manning, & Souther (1985)	Between groups design: <i>Posttest only comparison group design</i>	<u>Tactile aids</u> were used to teach blind and sighted students concepts of <u>sewing machine tension</u> : balanced, loose, and tight (fabric squares with various types of stitching).	Learned concept of sewing machine thread tension.
Personal self care (3)	Dunn, Cunningham, & Backman (1998)  Gast, Winterling, Wolery, & Farmer (1992)  Ulicny, Adler, & Jones (1990)	Single participant designs (3): <i>MB x settings (1); MB x participants (2)</i>	Treatment used two main components: self control, and continuous external reinforcement; Treatment package consisted of small group instruction and constant time delay paired with a backward chain to teach first aid skills; Behavioral scripts and training (rehearsal/ role playing) to improve interview skills of potential attendants.	Reduction in drooling behavior; increase in self esteem; acquisition of first aid skills (cleaning and bandaging a cut, insect bite, and minor burn); acquisition of effective attendant interview skills
Interventions designed to reduce stereotypic/aberrant behaviors (3)	Freya (1997)  Gunter, Fox, McEvoy, Shores, & Denny (1993)  Johnson, Hunt, & Siebert (1994)	Single participant designs(3): <i>MB across settings with replication x participants (2); MB x behaviors and withdrawal of treatment(1)</i>	First study taught Ss to orient to environmental stimuli through system of least prompts and use of sports watch.  Second study used music (through lightweight headphones attached to a small cassette player) non-contingently and contingently applied across four tasks/ settings.  Last study: Food discrimination training using placemat and contingent mild punishment for occurrences of pica.	Increase in noticing/ orienting to environmental stimuli, and reduction in stereotypic behaviors.  Reduction of aberrant, repetitive behaviors and task performance differentially affected by intervention.  Decrease in pica and food scavenging across settings within institution.

Curricular areas	Studies	Designs	Intervention features	Outcome features
Other intervention: use of ABA to teach reinforcer preference- then used to train other skills (1)	Wacker, Berg, Wiggins, Muldoon, & Cavanaugh (1985)	Single participant design: <i>MB x participants- also alternating treatments</i>	Verbal prompt-delay- physical guidance-praise used to teach a motoric response (hold head up)- paired with music or other reinforcer. Correct response- then to operate switch attached to reinforcer.	Demonstration of reinforcer preferences by participants.

Table 4

*Meta-Analytic Results of Between Groups Studies*

Study	Experimental Group			Alternative Group			Effect Size <i>d</i>	Confidence Interval	
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>		Lower	Upper
Browning (1985)	13	NA	NA	13	NA	NA	.03	NA	NA
Cuvo, Davis, & Gluck (1991)	10	74	12.61	10	65.60	16.99	.54	-.36	1.43
Fisher & Field (1985)	59	NA	NA	20	NA	NA	1.03	.49	1.46
Hoge, Dattilo, & Williams (1999)	18	12	.46	16	-.11	.22	.61	-.08	1.30
Lee & Tang (1988)	38	5.44	6.28	34	-1.06	6.25	1.03	.53	1.52
MacDonald (1985)	6	3.94	.71	6	2.72	.90	1.39	.07	2.70
Ninot, Bilard, Delignieres, & Sokolowski (2000)	8	.25	.09	8	.03	.15	1.68	.49	2.87
Westling, Floyd, & Carr (1990)	8	18.31	11.41	7	15.59	17.05	.18	-.84	1.20
Mean Effect Size							.90	.63	1.18

Note: A mean, standard deviation, or confidence interval rating of “N/A” indicates a study in which the effect size was calculated through an odds ratio or a non-parametric statistic and subsequently converted to Hedges *g*.

Table 5

*Meta-Analytic Results of Single Participant Studies*

Study	Participant Scores			Effect Size	Confidence Interval	
	<i>n</i>	<i>M</i> <sub>1</sub>	<i>M</i> <sub>2</sub>	Hedges' <i>g</i>	Lower	Upper
Aeschleman & Gedig (1985)	3	43.67	80.58	4.64	-4.37	13.64
Arnold-Reid, Schloss, & Alper (1997)	3	55.20	89.38	3.24	-8.71	15.19
Branham, Collins, Schuster, & Kleinert (1999)	3	15.88	75.95	2.22	-28.36	32.81
Collins, Hall, & Branson (1997)	3	14.00	77.78	3.14	-19.87	26.14
Collins, Stinson, & Land (1993)	3	12.37	75.91	1.88	-36.33	40.09
Cuvo, Davis, O'Reilly, Mooney, & Crowley (1992)	4	26.05	42.93	2.09	-5.82	10.00
Denny & Test (1995)	3	.94	5.20	7.38	6.73	8.04
Domaracki & Lyon (1992)	4	3.75	91.35	19.21	14.74	23.68
Dunn, Cunningham, & Backman (1998)	1	-2.06	-0.04	2.38	.72	4.04
Evans, Evans, Schmid, & Pennypacker (1985)	6	.21	.64	1.35	1.09	1.60
Frea (1997)	2	-51.70	-5.85	10.56	4.55	16.58
Gast, Winterling, Wolery, & Farmer (1992)	3	.78	4.16	4.69	3.88	5.51

Study	Participant Scores			Effect Size	Confidence Interval	
	<i>n</i>	<i>M</i> <sub>1</sub>	<i>M</i> <sub>2</sub>	Hedges' <i>g</i>	Lower	Upper
Gumpel & Nativ-Ari-Am (2001)	4	3.50	48.30	11.92	8.23	15.60
Gunter, Fox, McEvoy, Shores, & Denny (1993)	1	3.00	79.12	5.69	-20.51	31.90
Haring, Kennedy, Adams, & Pitts-Conway (1987)	3	53.20	86.80	4.49	-3.99	12.96
Haring, Breen, Weiner, & Kennedy (1995)	2	41.25	83.53	1.93	-28.40	32.26
Hastings, Raymond, & McLaughlin (1989)	7	9.92	25.03	2.14	-3.12	7.40
Horsfall & Maggs (1986)	3	33.11	74.81	2.19	-19.41	23.78
Johnson, Hunt, & Siebert (1994)	2	-51.81	-17.86	3.17	-11.65	17.00
Keogh, Faw, Whitman, & Reid (1984)	2	21.15	82.80	8.62	-1.29	18.53
Lagomarcino, Reid, Ivancic, & Faw (1984)	3	5.28	62.92	12.08	6.69	17.48
Mahon & Bullock (1992)	3	59.38	67.58	.37	-25.12	25.75
Mechling, Gast, & Langone (2002)	3	.83	3.55	3.84	3.04	4.64
Miller & Test (1989)	3	20.00	72.60	4.22	-9.90	18.33
Nietupski, et al. (1986)	3	18.24	80.00	3.30	-17.90	24.49
O'Conner & Cuvo (1989)	3	24.58	56.81	3.01	-9.10	15.12
Schloss, et al. (1995)	2	4.65	11.10	5.81	4.27	7.34
Smith, Collins, Schuster, & Kleinert (1999)	4	.35	7.11	18.02	17.65	18.39

Study	Participant Scores			Effect Size	Confidence Interval	
	<i>n</i>	<i>M</i> <sub>1</sub>	<i>M</i> <sub>2</sub>	Hedges' <i>g</i>	Lower	Upper
Test, Howell, Burkhart, & Beroth (1993)	3	1.03	3.11	1.56	.06	3.07
Trask-Tyler, Grossi, & Heward (1995)	3	5.25	10.51	1.59	-2.14	5.33
Ulicny, Adler, & Jones (1990)	3	23.25	83.13	6.32	-4.41	17.04
Vandercook (1991)	5	15.50	40.40	4.30	-.77	9.38
Wacker, Berg, Wiggins, Muldoon, & Cavanaugh (1985)	5	568.10	956.00	1.09	-311.49	313.66
Wall, Gast, & Royston, (1999)	3	15.22	57.90	6.79	-.33	13.90
Winterling, Gast, Wolery, & Farmer (1992)	3	1.54	7.66	6.8	5.78	7.81
Wissick, Lloyd, & Kinzie (1992)	3	3.11	23.73	1.58	-13.17	16.34
Zetts, Horvat, & Langone (1995)	6	5.65	7.24	1.55	.74	2.37
Zhang, Gast, Horvat, & Dattilo, (1995)	4	1.49	5.98	6.08	5.36	7.32
Mean Effect Size				6.13	5.96	6.30

Note: *M*<sub>1</sub> is the participants' average score during baseline and *M*<sub>2</sub> is the participants' average score during treatment phases of the interventions.