

Learning Strategy Instruction for College Students with Disabilities: A Systematic Review of the Literature

Michael Faggella-Luby¹
Nicholas Gelbar²
Lyman Dukes III³
Joseph Madaus⁴
Adam Lalor⁵
Allison Lombardi⁴

Abstract

The growing number of individuals with disabilities in higher education is a sign of significant progress toward improving outcomes and equity as intended by federal legislation. However, to successfully meet the demands of the postsecondary environment, students must act as self-regulated, independent learners. Thus, instruction for students with disabilities in learning strategies may be necessary to actualize improved outcomes. The current systematic review analyzes a subset of 21 empirical articles on learning strategy instruction in higher education for students with disabilities spanning 1955-2015 as organized by the PASS Taxonomy (Dukes, Madaus, Faggella-Luby, Lombardi, & Gelbar, 2017). Results confirm there is a paucity of research, as we identified only 21 intervention studies examining learning strategies (11 single case and 10 group-design studies) in higher education during the period studied. Findings are presented related to characteristics of the study corpus, types of learning strategies emphasized, instructional delivery context, settings, interventionist, fidelity, measures, and outcomes. Special emphasis is placed on group design studies.

Keywords: learning strategy, postsecondary education, disability, strategy instruction, systematic literature review

Over thirty years ago, experts in postsecondary disability services recognized that college students with learning disabilities (LD) lacked a comprehensive set of learning strategies that would allow them to independently complete academic tasks (Shaw, Byron, Norlander, McGuire, & Anderson, 1988). Additionally, postsecondary education and disability pundits stated that instruction in learning strategies was more effective than tutorial assistance (Brinckerhoff, 1991). Indeed, evidence of the value of learning strategy instruction is seemingly ubiquitous. McGuire, Hall, and Litt (1991) established a taxonomy for academic and learning strategy needs in which time management, test-taking, notetaking, and study strategies were all substantial needs of participating students with LD. In a series of studies, Butler (1998) determined college students with LD who apply strategic approaches to academic tasks exhibit improved academic performance. College students with disabili-

ties have also acknowledged the value of the application of strategies to manage their learning challenges (Skinner, 2004). In the Skinner study, students pointed to practices such as goal-setting, self-advocacy, and recall strategies as being of particular importance.

Centers for Students with Disabilities (CSD) professionals, the primary personnel charged with overseeing services provided to college students with documented disabilities, have an arguably complex position regarding the provision of learning strategies instruction in higher education. McGuire et al. (1991) conducted a study examining student use of strategies in an LD support program at a four-year institution in the Northeast and concluded that there is a significant need for strategy instruction. In fact, among the services provided by the program was training in the use of an array of learning strategies. Program data consistently demonstrated that students with LD enrolled in the program had graduation rates

¹ Texas Christian University; ² UCONN Health; ³ University of South Florida St., Petersburg; ⁴ University of Connecticut; ⁵ Landmark College

on par with students without disabilities at the university (McGuire, 2002). However, despite research literature supporting learning strategies as a practice of possible merit, their use has been less noteworthy in actual day-to-day professional activity.

For example, when a representative sample of CSD professionals were tasked with identifying CSD Program Standards and Performance Indicators, a set of guidelines designed to be applicable to programs across the U.S. and Canada, advocacy for *learning strategies* was among the practices not rated as an essential CSD responsibility (Shaw & Dukes, 2006). Specifically, the proposed Standard, “Advocate for the availability of instruction in learning strategies (e.g., attention and memory strategies, time management, organization) for students with disabilities” (Dukes, 2006, p. 11) was rated “not essential.” Readers should bear in mind the intent of the Program Standards, which is to “... facilitate *equal* access to postsecondary education for students with disabilities ...” (emphasis added; Dukes 2006, p. 6). Thus, a rating of “not essential” was not a mandate opposing the value of strategy instruction, rather it was a stance intended to define the parameters of CSD responsibility.

Even so, numerous colleges and universities are providing training in learning strategies as well as other supports. The Strategic Alternative Learning Techniques (SALT) program at the University of Arizona, the Program for Advanced Learning (PAL) at Curry College, the Bentsen Learning Center at Mitchell College and the Beyond Access Program at the University of Connecticut are four current examples. These programs, as well as others, provide training in skills such as self-advocacy, study skills, time management, goal setting, and reading and writing strategies, thus indicating a recognition of their role in the potential success of college students with disabilities. One important caveat is that many services of this nature are provided to students with disabilities for an additional fee over and above the fees charged for typical college attendance.

Recent evidence indicates that, taken together, the professional literature on the population lacks any demonstrative conclusions regarding evidence-based practices that may improve postsecondary academic outcomes for college students regardless of disability type (Madaus et al., 2016; Peña, 2014). Moreover, the evidence that does exist has often been derived from studies with questionable methodological rigor (Madaus et al., 2016). Given the circumstances, there are now calls for both scientifically validated practices that promote college matriculation for students with disabilities and inform service delivery by CSD professionals (Dukes et al., 2017) as well as concomitant

research guidelines intended to result in rigorously designed research regarding the development, study, and application of evidence-based practices in higher education.

Postsecondary Student Profile of Learning Strategy Use

Several descriptive studies have compared the use of learning strategies by students with and without disabilities at the postsecondary level, which yielded a complex and contradictory pattern of results. Kirby, Silvestri, Allingham, Parilla, and LaFave (2008) compared students with and without dyslexia. The two groups did not differ on either the deep or surface strategy subscales of the Study Process Questionnaire-Revised (Biggs, Kember, & Leung, 2001). On the Learning and Study Strategy Inventory ([LASSI-II], Weinstein, Palmer, & Shulte, 2002), students with dyslexia had higher scores, indicating better performance, on the selecting main ideas and test-taking strategies subscales. Kovach and Wilgosh (1999) conducted a similar study, but uncovered a different pattern. Students with LD had lower scores (versus the standardization sample) on the test-taking strategies, self-testing, selecting main ideas, and motivation subscales but higher scores on attitudes towards success and anxiety subscales of the LASSI-II. Abreu-Ellis and colleagues (2009) replicated this study and found a similar pattern of differences between students with LD and the LASSI-II standardization sample. Another study compared students with LD, Attention Deficit Hyperactivity Disorder (ADHD), and a control group without disabilities (Corkett, Parrilla, & Hein, 2006). Students with LD had higher scores on the concentration, selecting main ideas, study aids, test-taking strategies, and time management subscales of the LASSI-II than students with ADHD and had higher scores on the study aids subscales versus the control group.

Two recent studies have explored the impact of learning strategy use on college grade point average (GPA) in students with a history of reading difficulties versus students without such a history. In the first study, metacognitive reading strategies (as measured by the MRSQ; Taraban, Ryanearson, & Kerr, 2000) and the study aids subscale of the LASSI-II were the only significant predictors of college GPA in students with a history of reading difficulties (Chevalier, Parrilla, Ritchie, & Deacon, 2017). In the second study which utilized larger samples of both groups, none of the subscales of the aforementioned measures were significant predictors of GPA for students with a history of reading difficulties (Bergey, Deacon, & Parrilla, 2017). Thus, it is currently unclear whether college

students with a history of reading difficulties use of different learning strategies is linked to academic achievement. The authors note “commonly used study strategy inventories have limited value in predicting their academic success” (Bergey et al., p. 81).

Rationale for the Present Study

In contrast to the postsecondary literature, a robust body of research on learning strategies for adolescent students with disabilities in secondary settings exists in four major areas: reading comprehension, writing, mathematics, and peer collaboration (Scheuermann et al., 2009) and researchers have comprehensively and transparently defined and documented evidence of school-based instructional practices that have evidence of effectiveness. The What Works Clearinghouse (WWC) and the National Technical Assistance Center on Transition (NTACT) are two such organizations charged with compiling evidence regarding scientifically valid practices. NTACT, for example, based upon a strictly defined set of expectations, has determined that there is strong evidence for the use of learning strategies in an array of secondary-level academic courses (Test et al., 2009). Secondary-level students who engage in self-regulated learning, which includes the employment of various learning strategies, have better achievement outcomes than students who do not apply these methods (Schunk & Zimmerman, 2007; Zimmerman, 2008). Moreover, students can be taught to apply self-regulated learning strategies, subsequently resulting in improved academic achievement (Labuhn, Zimmerman, & Hasselhorn, 2010). There has been a similar call for the use of evidence-based practices for students with disabilities in college settings (Madaus et al., 2016). Given that the demands of higher education require independent and self-regulated learners, instruction in these skills is of paramount importance in order to promote student success.

However, there are several limitations to the existing literature base in regard to learning strategies and postsecondary students with disabilities. First, it has focused predominantly on students with LD. Second, it may have been impacted by the use of measures that may not be reflective of new technologies that can aid studying (e.g., apps for notecards, online cloud-based note taking systems) and also may lack the sensitivity to differences in learning strategy use. In addition, as previously noted, while learning strategies have been proven to be effective at the secondary level, and there have been calls for their use at the postsecondary level, no one has yet synthesized the literature to guide practice. Therefore, the purpose of the present study was to systematically review the literature on interventions related to learning strategy instruction and use at the

postsecondary level and, specifically, to examine the types of research methods used, the settings, populations and specific strategies studied.

Method

In order to understand the state of the literature regarding learning strategy instruction for students with disabilities at the postsecondary level, a systematic review was conducted. Two sources were employed to gather relevant literature. First, a database of articles was collected as part of a systematic review of the corpus of literature about college students with disabilities (Madaus et al., 2016). A detailed account of the procedures used to assemble this database is available elsewhere (Madaus et al., 2016). Second, a replication of the previous search procedure for articles published between 2012 and 2015 was completed to update the literature missing from the first database.

Published Articles – Database

The systematic review resulted in 1,036 peer-reviewed journal articles published prior to December 31, 2012. In order to conduct the review, the following Boolean search was completed using Academic Search Premier, ERIC, PsycINFO, and Medline: (search terms: “college student” or “university student” or “postsecondary education” or college or university or “college admission” or “higher education” or “student affairs” or “student services” or “student personnel”) AND (disability or “hearing impair*” or deaf or disabled or handicap or ADHD or ADD or dyslex* or blind or disabilities or accommodation or “mental illness” or “mobility impairment” or “visual impairment”). This was supplemented by a hand search of 25 higher education and student affairs journals. These journals included: *College Teaching*, *Journal of College Student Development*, *Journal of Student Affairs Research and Practice*, *Higher Education*, and *NACADA Journal* as well as every article published in the *Journal of Postsecondary Education and Disability* (and its previous iterations).

A two-step procedure was utilized to determine if publications met the criteria for inclusion (see below). First, members of the research team screened the titles and abstracts to determine if they met the inclusion criteria (described below). Second, the full text of articles that remained was screened using a coding sheet in which information concerning the characteristics of each publication was noted (e.g., article methodology, study demographics). Article topics were coded according to the PASS Taxonomy (citation masked for peer-review). The PASS Tax-

onomy required that publications be categorized into domains and concomitant subdomains. Two members of the research team screened the full text of articles comprising the student-focused and concept and systems development domains to determine if they were primarily about learning strategy instruction. Following this review, coder agreement for inclusion was 83%. Coding teams met to discuss disagreements, resulting in 100% consensus. Upon completion of this process, 61 articles were determined to be primarily about learning strategy instruction.

Published Articles – 2012-2015

The second source of articles was a replication of the previous search procedure for articles published between 2012 and 2015. The decision was made to overlap the two searches for the year 2012 to gage the reliability of the second search.

An identical Boolean search was conducted using the original search criteria. However, given this study's purpose, one additional condition was included in order to elicit articles focused solely on learning strategy instruction. Thus, the following search terms were added: AND (“learning strategy” or “study strategy” or “learning skill” or “academic skill” or “academic strategy” or “reading strategy” or “writing strategy” or “test taking strategy” or “math strategy” or “strategy instruction” or mnemonic or “cognitive strategy” or “assistive technology” or “word processing”). A hand search of articles was also conducted of the five most cited journals from the original systematic review: *Journal of Postsecondary Education and Disability*, *Journal of Learning Disabilities*, *Journal of College Student Development*, *College Student Journal*, *Disability & Society*, and *Journal of Vocational Rehabilitation*.

This search resulted in an additional 125 articles. Some publication overlap did result as a function of the dual search process. An article database was employed to eliminate a number of articles published in 2012 and some gathered during the hand search that had been included in both search processes. Following the removal of duplicates, 83 discrete articles remained. As before, two research team members screened the titles and abstracts of the articles to determine if they met inclusion criteria. This resulted in 81% agreement. Following previous protocol, the coders met to reach consensus on any disagreements. Subsequently, an additional 21 articles were included as a function of the second search.

Inclusion Criteria

As mentioned, a set of criteria was used to determine eligibility for inclusion. First the article had to

be published in English in a peer-reviewed journal. Secondly, the article had to be published before December 31, 2015. Third, the article had to be focused on college students with disabilities who had sought or were seeking degrees. Included publications had to be about students, faculty, disability services, or any service delivery/assessment process for students with disabilities. With regard to students, articles were included if she or he had earned college acceptance (e.g., summer transition program), were currently enrolled, withdrawn from, or were college graduates. Articles were not included if they were about students who were transitioning to college, but had not yet been accepted.

The final criterion was that the article had to focus on learning strategy instruction, which was defined as instruction provided to students to improve their ability to use a specific strategy during studying/reading and/or to help them manage their time more effectively. Zimmerman's seminal definition of self-regulated learning strategies (1989) is “actions and processes directed at acquiring information or skill that involve agency, purpose, and instrumentality perceptions by learners” (p. 329) and it was used to determine the working definition for the current examination. It is important to note that strategies used by instructors to facilitate learning (e.g., guided notes) were not included as they primarily reflect instructor behavior rather than skills designed for independent use by students. Therefore, articles were included if the action of the instructor, or assistive technology, was intended to result in independent student use of a strategy.

Coding Process

As previously indicated, the research team examined the characteristics of articles that met the inclusion criteria after the full-text review. A description of the original coding sheet is available elsewhere (Madaus et al., 2016). Germane to both the previous and current examination, data were collected on whether the article presented original data and if so, the methodology of data collection (e.g., qualitative, descriptive quantitative, or empirical). In addition, a supplementary coding procedure was developed to gather evidence about the nature of the learning strategy instruction. Specifically, the duration and frequency of instructional session, the session setting, and type of interventionist (e.g., research team member) were coded.

Finally two types of data about the learning strategy were collected. First, based upon a taxonomy developed by Deshler and Schumaker (2006), each was recorded as an acquisition, storage, or expression strategy. Executive functioning was also included

given the postsecondary context. Second, open coding of strategy descriptions was collapsed into four unique categories representing word-level, reading comprehension, test taking, or other strategies. The coding tool employed is available upon request from the first author. Two research team members coded all articles that met inclusion criteria and met regarding any disagreements.

Results

Study Corpus

Characteristics. The publication search (i.e., original database, published prior to December 31, 2012) included 61 articles and the second search (published between January 1, 2012 and December 31, 2015) included 21 additional articles for a total of 82. Sixty-one articles did not investigate the use of an intervention to improve the learning and study strategies of individuals with disabilities and were not included in the subsequent analyses. Thus, a total of 21 articles investigated interventions using either group ($n = 10$) or single case ($n = 11$) designs (see Table 1 for number of studies by study type). Sixty-two unique authors contributed to the 21 manuscripts with only two authors listed on two articles (D. L. Butler; J. W. Madaus). The articles were published in 16 journals with only one journal publishing more than one article: *Journal of Postsecondary Education and Disability* ($n = 6$). A total of 550 individuals participated in the studies with 504 participating in the group-design studies.

Single-case design studies. Single case studies employed a variety of research designs, with few research designs matching the recommendations for high quality as set forth in the literature (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005). For example, only three used an alternating treatment design with four employing a multiple baseline to show repeated effects. Of the four multiple baseline studies half ($n = 2$) used a multiple probe design, which is less than ideal (Horner et al., 2005). Of the remaining four studies, two used A-B design and one each employed a B-C and ABAC design (see Table 1 for more and Table 2 for a list of citations).

Context and population. As shown in Table 3, the empirical literature is overwhelmingly based on studies conducted in postsecondary institutions in the U.S. ($n = 15$). Additionally, the largest group of participants attended 4-year colleges or universities ($n = 12$). The descriptions of the demographic characteristics of the sample were poor (see Table 3), with disability and gender being the most commonly reported demographics.

Type of learning strategy. Of particular interest in the current investigation is the type of learning strategy (see Table 4). Strategies were coded for focus on acquisition, storage, expression, or executive functioning. The most common strategies addressed teaching students' acquisition skills ($n = 15$), such as word-level reading interventions, and expression ($n=12$) focused predominantly on writing interventions and some test taking.

Empirical Group Studies

An additional component of the current analysis involved isolating the empirical group design studies for examination due to the poor research designs used in the single case studies (see Table 5 for a depiction of the group studies included in this analysis). Nine group design studies were included in the analysis. A tenth (Ghesquiere, Laurijssen, Ruijsenaars, & Ongheena, 1999) was not further examined as it provided data from an international exploratory study of the listening (auditory) skills in comparison to the tactile skills of students who are visually impaired compared to their typically sighted peers. This study utilized group statistics and a comparison group, but did not test an intervention.

Study Designs. Of the group design studies, only two were randomized control trials (Field, Parker, Sawilowsky, & Rolands, 2013; Gaddy, Bakken, & Fulk, 2008), as defined by the WWC (U.S. Department of Education, 2014) and as depicted in Table 4. Of the remaining eight studies, three included a one-group pretest-posttest measure of growth, two used a static group comparison, two used a one group with counterbalanced instruction, and, finally, one descriptive case study (see goo.gl/W0v53N for the taxonomy utilized to categorize articles).

Among the group design studies, eight used either standardized norm-referenced assessments to measure outcomes or a combination of standardized and researcher-developed measures. Additionally, eight studies employed a comparison group to discern any differences between conditions. However, of the group design studies only three established baseline or pretest equivalence between groups. Further, only three studies included non-disabled peers for comparison purposes.

Learning strategies emphasized. There are a variety of learning strategies designed to support acquisition, storage, and expression of information but the manner in which these have been studied varies considerably. Three studies isolated acquisition strategies in (a) phonics instruction via the Orton-Gillingham approach (Guyer & Sabatino, 1989); (b) assistive technology via the Kurzweil software for reading

(Hecker, Burns, Elkind, Elkind, & Katz, 2002); and (c) a text structure strategy for reading expository science content (Gaddy et al., 2008). Alternatively, three studies examined courses designed to provide a variety of foundational skills related to success in higher education courses including note taking, reading textbooks or articles, organizing thoughts prior to writing, time management, and test taking (Burchard & Swerdzewski, 2009; Mytkowicz, Goss, & Steinberg, 2014). One of the courses also addressed psychosocial skills for first year students (Reed, Kennett, Lewis, & Lund-Lucas, 2011). Another study examined assessment strategies in order to prevent procrastination and deal with test anxiety (Kovach, Wilgosh, & Stewin, 1998). Finally, two studies examined coaching models. The first involved peer-based coaching to address self-efficacy and study skills (Zwart & Kallemeyn, 2001) and the second trained experienced coaches (minimum of two years) to support student executive functioning skills and well being (Field et al., 2013).

Instructional delivery context. Strategy instruction was delivered along a continuum from explicit to implicit with dosage varying from short episodes to instruction lasting longer than six months. Variations in instructional dosage, even when separated from specific outcomes, are of significant practical importance for implementation. In the study corpus, eight of the nine studies provided weekly interactions (Mytkowicz et al., 2014 was unclear regarding delivery frequency).

The duration of courses varied considerably. Only one study occurred over a single week (5 days) with 30 minutes each during the first two days and then immediate, elapsed, and delayed testing respectively on the final three days of the study (Gaddy et al., 2008). Two studies occurred over five-week intervals (Guyer & Sabatino, 1989; Zwart & Kallemeyn, 2001). Zwart and Kallemeyn (2001) specifically involved two to ten coaching sessions for one hour per week. Four studies occurred for at least one semester. Two of these studies provided courses for credit (Burchard & Swerdzewski, 2009; Reed et al., 2011) whereas another provided one to three hours of training plus five additional components of learning spread throughout a semester (Hecker et al., 2002).

The final two studies occurred for more than six months. The first study employed a two hour intake followed by one half hour session per week by phone for 24 weeks (six months; Field et al., 2013). The second provided one-hour sessions totaling 8.5 hours over seven-months (Kovach et al., 1998).

Instructional setting. All nine studies used a person-to-person point of contact for intervention though this was not always face-to-face. Specifically,

in all but one study, there was a face-to-face interaction via either a clinic or classroom setting. The lone exception was the Field et al. (2013) study in which coaches followed up with students weekly by phone.

Interventionist and fidelity. Researchers, or members hired by the research team from outside the instructional setting, provided the intervention instruction in six of the nine studies. The three exceptions included a special course instructor in a clinic setting (Guyer & Sabatino, 1989), two types of trained coaches and peers (Zwart & Kallemeyn, 2001), and professionals (Field et al., 2013). No studies mentioned the use of fidelity or treatment integrity measures to ensure quality or adherence to implementation.

Outcome measures. Measuring instructional outcomes, whether distally or proximally to the specific strategy, provides critical information about the efficacy of pedagogy as well as the potential for using common measures across studies to compare outcomes amongst studies. Only three of the group design studies utilized researcher developed measures including a survey of participant reflections on learned strategies (Kovach, et al., 1998), an immediate and delayed retell measure (Gaddy et al., 2008), and a revised version of the Levine “canceled mind trips” assessment (Hecker et al., 2002). Across the remaining studies, there were few common standardized measures. Two studies used Weinstein and colleagues’ (1987) Learning and Study Strategies Inventory (LASSI; Zwart & Kallemeyn, 2001; Field et al., 2013) and two studies employed Schraw and Dennison’s (1994) Metacognitive Awareness Inventory (MAI; Burchard & Swerdzewski, 2009; Mytkowicz et al., 2014). Finally, we note that a meta-analysis is currently not possible due to a lack of consistent instructional and achievement measures, and more importantly several studies with incomplete information.

Distal academic outcomes were measured in five of the nine studies. Two studies used different, but standardized measures of reading. The first study used a standardized reading measure, the WRAT-R, to show growth pre- to post-based on an Orton-Gillingham phonics instruction, but no differences between groups were found (Guyer & Sabatino, 1989). In the second study, the Nelson-Denny Reading Test revealed the treatment group improved significantly more on reading rate, but there were no differences in comprehension gain between the groups (Hecker, et al., 2002). A final study involving reading instruction used retell measures in which outcomes favored experimental group in immediate and delayed assessments, but this varied by passage type indicating an

effect for text structure to explain outcomes (Gaddy et al., 2008). Further, only 40% of students could accurately identify the specific text structure for assessment passages indicating an inability to effectively apply the specific expository text structure strategy.

Using a more global measure, two studies used grade point average (GPA) as a distal measure for strategy learning. GPA showed no differences over eight months between groups (Kovach, et al., 1998), but GPA was correlated with several subprocesses of the Metacognitive Awareness Inventory ([MAI]; Mytkowicz et al., 2014). The remaining four studies did not measure distal academic outcomes, instead measuring self-efficacy, metacognition, or perceptions of strategy knowledge/use (Burchard & Swerdzewski, 2009; Field et al., 2013; Reed et al., 2011; Zwart & Kallemeyn, 2001).

Disaggregated findings by disability. Disaggregated findings by disability, especially in group studies, allow for examination of the differential impact of the interventions on specific groups of students. Fortunately, five studies did provide more isolated findings as three studies included only students with LD (Gaddy et al., 2008; Guyer & Sabatino, 1989; Reed et al., 2011) and two studies included only students with ADHD (Field et al., 2013; Hecker et al., 2002) as a primary diagnosis. However, as these are generally considered to be heterogeneous populations, such a generic description as LD/ADHD provides little to guide practitioners when assessing the fit of the intervention to their particular situation. Finally, four of the nine studies did not disaggregate the data across disabilities thus making it difficult to determine specific outcomes for individual disability diagnoses.

Discussion

The current synthesis of literature involving students with disabilities in postsecondary education is a further refined examination of our team's work to examine the higher education literature corpus for this population. As growing numbers of students enroll in higher education, it is imperative to synthesize the specific practices, in this case, learning strategies, which may promote the development of independent, self-regulated learners.

Of more than 2,000 reviewed articles, only 82 met the four study criteria thus resulting in further examination. Of these, only 21 articles empirically investigated a learning strategy intervention, including nine group designs (1 group design study in the original ten was not an intervention but rather an exploratory study) and 11 single case designs. Given the wide range of disability diagnoses common in college

settings, the body of literature concerning learning strategy instruction is deficient, to say the least. Such a dearth indicates the nine group studies (participant $n = 504$) bear a significant burden when attempting to draw conclusions of efficacy.

Sixty-two unique authors contributed to the 21 intervention articles and this is significant for at least two reasons: (1) The field's literature base has been published in an array of journals by an array of authors including doctoral students and higher education administrators. Due to the paucity of empirically derived research on learning strategies in postsecondary education, the potential value of each contribution is magnified. Second, and perhaps most significantly, there do not appear to be any scholars that have carved out a meaningful programmatic line of research on the topic. It is reasonable to conclude that there is both a need and opportunity for researchers to conduct empirically driven studies regarding strategy use in higher education, particularly given that they are, seemingly, practices that improve student outcomes. The need for intervention-based studies cannot be overstated as the quality and efficacy of practice depends upon a body of scholarship that both defines and drives learning strategy techniques. For example, researchers should consider partnering with specific campus programs (e.g., academic support centers and CSD) to examine and publish research results, utilizing group design procedures with the goal of demonstrating improved outcomes (both proximal and distal) for students with disabilities.

Further, criteria for performing quality research should be employed. For example, the What Works Clearinghouse (WWC) randomized controlled trial designation spells out stringent expectations for the completion of group design studies. Of the 9 group studies included in the current examination, only two studies (Field et al., 2013; Gaddy et al., 2008) may have met the WWC criteria as a function of research design. While challenging to conceive and perform, it is essential that more studies of this nature be conducted in order to broach claims of efficacy or generalization.

Alternatively, seven of the nine group design intervention studies utilized standardized measures and this should be considered a strength. However, one limitation of the literature is that very few studies used the *same* standardized measures, thus making comparisons across studies all but impossible. Other limitations of the group design studies include: a failure in all but three studies to determine baseline or pretest equivalence between groups, and a failure to include comparison groups of non-disabled peers to determine the relative impact of an intervention to

close the achievement gap between students with and without disabilities. These limitations are likely markers of a fledgling field and point to the need for further research employing alternative research designs with the goal of generating sufficient data to support intervention selection and as well as implementation guidance.

With regard to measurement, it is also noteworthy that only five of the nine studies measured academic outcomes directly. Whether specific to reading skills or more global measures of learning such as GPA, appraisals of this nature are necessary to judge the overall impact of an intervention on learning. If students with disabilities are truly to become independent, self-regulated learners, both proximal and distal measures are critical. One potential option is to proximally measure both learning strategy knowledge and use (as in Faggella-Luby, Schumaker, & Deshler, 2007) in addition to content and distal measures of learning. Subsequently, the academic outcomes might be utilized by faculty and student support services for instructional, data-driven decision making to guide intervention implementation, coaching, and program design. Additionally, very little is currently known about whether outcomes are mediated or moderated by demographic factors such as class standing, gender, or disability category. Future research must endeavor to deliver a clearer picture of study participants as well as disaggregation of findings.

As noted, two-thirds of the group design studies used researchers or members hired by the research team from outside the instructional setting to deliver intervention instruction. That matter, along with the lack of fidelity measures across the group design studies examined, raise significant questions about the plausibility of intervention implementation. Moreover, interventions are neither documented as having been implemented as designed, nor is data provided to indicate what is plausible or efficacious when others (i.e., non-researchers) attempt to implement the selected practice.

Single case design research has proven especially valuable in early intervention studies for both secondary and postsecondary studies concerning students with disabilities (Maggin & Chafouleas, 2013). However, in the current analysis, very little can be gleaned from the single case research as the designs demonstrated limited repeated affects and employed less-than-ideal multiple probe designs (e.g., Horner et al., 2005). Given the limited number of students with specific disabilities on any single campus (e.g., visual impairments, autism, intellectual disabilities) we recommend utilizing the single case design following the procedures outlined by Horner and colleagues (2005).

Notably, of the learning strategy studies examined, almost half ($n = 7$) taught students word-level decoding strategies rather than emphasizing fluency or reading comprehension strategies. This may reflect findings by Hock and colleagues (2009) in which struggling adolescent readers were found to have a reading profile statistically significantly below proficient peers in word-level reading including fluency, vocabulary, and comprehension (Hock et al., 2009). However, given the limited demographic and reading profiles in the literature base, we speculate that intervention in topical areas beyond word recognition may be a critical feature missing from current service delivery, as it is certainly absent from the research literature. Finally, given the focus of strategies in three main areas only (i.e., acquisition, storage, and expression) it may be illuminating to conduct a more thorough needs analysis of the match between the demands of the curriculum and skills of postsecondary students with disabilities. Such an analysis may necessitate more sensitive instruments to measure actual strategy use over merely self-reported strategy surveys.

With growing numbers of students attending postsecondary institutions, research on the efficacy of different modes of service delivery are essential for program design, delivery, and success. In the current examination, consistent contact was a component of eight of the nine studies which included weekly interactions and all nine providing person-to-person interaction. However, the overall dosage of these studies was varied ranging from half-hour to multi-hour sessions, compressed to within a week, or extended to more than a semester. Notably, the results of the two extended duration intervention periods of more than a semester did not demonstrate improvements on academic outcomes. Further, the current literature provides little in scalable solutions with 15 studies instructing less than nine persons at a time, and two-thirds ($n = 10$) receiving individualized instruction. Although secondary-level IDEA protections and IEPs result in resources and legal protections for individualized learning strategy instruction, postsecondary institutions do not have the same obligation. Thus, it may be more likely that group design studies, and specifically, courses in which learning strategy instruction is emphasized with regular follow up for maintenance may be employed. As noted, with the group design studies of courses only measuring outcomes in five studies, little can be said to support this claim without further research.

Limitations

The coding system utilized for the literature review process required training for researchers and

graduate students across three universities. To allow time for coding, to ensure sufficient inter-rater reliability, and appropriate analysis, a full year was needed to bring about the conclusion of the examination. Therefore, ongoing analysis of the literature, including articles published since the end of 2015 may be warranted to test the merits of the conclusions drawn here.

Implications for Practice

Recently, there has been a call for the use of proven practices for students with disabilities, such as instruction in the use of learning strategies, in college settings (Dukes et al., 2017). Indeed, strategy instruction has become a common and critical component of the academic success of students with disabilities in K-12 school settings (Kamil et al., 2008) and a significant body of evidence exists to support their value (Test et al., 2009). While this review confirms there is less evidence of their effectiveness in the postsecondary environment, the dearth of evidence may simply be due to longstanding philosophical beliefs about the role of higher education personnel with regard to their instructional obligations and expectations about student preparation prior to college entry. Certainly, these stances appear to be under scrutiny, not only in the higher education and disability literature (Lombardi, et al., 2016), but even legislatively. According to Dukes et al. (2017),

Given the current focus in higher education on accountability metrics tied to institutional funding that include improving institutional graduation rates, timeliness to graduation, and, in some cases, average earned salaries by recent graduates, personnel campus-wide have a responsibility in assisting all students in meeting their college objectives. (p. 116)

Such accountability measures are intended to reflect the performance of all students at an institution, regardless of disability status. Thus, CSD personnel are in a unique position to promote the value of their practices for both students with and without disabilities.

In the postsecondary milieu, there are numerous opportunities to both promote and disseminate knowledge about the value of the instruction, use, and empirical study of learning strategies. Perhaps, most salient are student academic assistance settings, which are now a common component of an array of student supports offered at college campuses. CSD personnel have an opportunity to serve collaboratively, both as a resource for students seeking academic assistance, but also as a resource to campus personnel charged with the development of academic assistance

programming. Indeed, in a recent study, students that employed learning strategies were associated with being 2.4 more times likely to earn a college degree than students with disabilities that did not utilize learning strategies in college settings (O'Neill, Markward, & French, 2012). Bear in mind that collaboration of this nature need not be limited to a student academic assistance center, but can also include serving as a resource for summer programs for incoming freshman or as part of a team developing or revising curriculum for first-year student success courses now offered at many postsecondary institutions.

As further evidence emerges to support instruction of learning strategies, collaborative opportunities may extend beyond services focused directly on student academic support. With professional development opportunities for instructional faculty becoming more commonplace, CSD professionals possess a range of knowledge that may inform improved teaching practices. Such professional development can be offered through an array of campus media. It can, of course, be offered in a typical face-to-face professional development session, but it might also be provided as part of annual or semi-annual faculty-wide gathering, as part of a campus speaker series, as a webinar, or as an online tutorial. For example, YouTube pages are now employed to provide an array of institutional information. In such a circumstance, CSD in collaboration with other campus academic support personnel could include information on the instruction and use of learning strategies in video format for both campus personnel and students alike. Secondly, collaborative research opportunities exist at many postsecondary institutions. The value of these options should not be overlooked. CSD staff are in a position to serve as part of a research team and, for example, help develop and organize the administration of a measurable strategy intervention, assist with arranging for student research participants, and collaborate on a publication spelling out study outcomes. Regardless of how CSD professionals become involved, we hope that as the research base for learning strategies in postsecondary settings increases, the field will come to recognize the "essential" nature of these instructional practices. In sum, it is worth noting that practices of this nature are well aligned with inclusive instructional practices such as universal design approaches that have been embraced by the CSD professional community. In fact, The Association on Higher Education and Disability's (AHEAD) Program Standard 2.2 highlights the use of universal design in instructional settings, which is intended to promote curricular access for all students, not just students with disabilities (Shaw & Dukes, 2006).

The current authors would be remiss if we did not specifically point to the few strategy methods that appear to have some level of efficacy. Speaking globally, there is some research-based support for strategy instruction generally (e.g., word-level reading and expression), as well as strategic content learning instruction, and for instruction in the use of guided notes (see Lalor, Lombardi, Madaus, Kowitt, & Dukes, 2014). Additionally, there are at least two coaching models examining peer-led coaching and another investigating student executive functioning skills that may have efficacy (Field et al., 2013; Zwart & Kallemeyn, 2001). Examination of these strategies and practices is beyond the scope of the current publication. In sum, it is well worth noting that the AHEAD Program Standards and Performance Indicators allude to, we believe, the value of strategic instruction with regard to student independence and, thusly, postsecondary academic success. Standard 5.1 notes, the CSD should “Use a service delivery model that encourages students with disabilities to develop independence” (Shaw & Dukes, 2006, p. 20). Indeed the development and use of academically-focused learning strategies is expressly intended to result in student-led, self-regulated learning and, subsequently, successful college completion.

Conclusion

The overall goal of education, especially higher education, is for students to develop into independent, self-regulated learners. Learning strategy instruction is a potential approach for facilitating this goal, especially for students with disabilities. Based on this systematic review, providing explicit instruction in learning strategy instruction in college can be viewed only as a potentially promising practice for this population. Establishing evidence-based approaches for assisting students with disabilities in becoming self-regulated learners is an essential progression for the field of postsecondary education and disability.

References

- Abreu-Ellis, C., Ellis, J., & Hayes, R. (2009). College preparedness and time of learning disability identification. *Journal of Developmental Education*, 32(3), 28-38.
- Bergey, B. W., Deacon, S. H., & Parrila, R. K. (2017). Metacognitive reading and study strategies and academic achievement of university students with and without a history of reading difficulties. *Journal of Learning Disabilities*, 50, 81-94.
- Biggs, J., Kember, D., & Leung, D. Y. P. (2001). The revised two factor Study Process Questionnaire: R-SPQ-2F. *British Journal of Educational Psychology*, 71, 133-149.
- Brinckerhoff, L. C. (1991). Establishing learning disability support services with minimal resources. *Journal of Postsecondary Education and Disability*, 9, 184-196.
- *Burchard, M. S., & Swerdzewski, P. (2009). Learning effectiveness of a strategic learning course. *Journal of College Reading and Learning*, 40, 14-34.
- *Butler, D. L. (1998). The strategic content learning approach to promoting self-regulated learning: A report of three studies. *Journal of Educational Psychology*, 90, 682-697.
- *Butler, D. L., Elaschuk, C. L., & Poole, S. (2000). Promoting strategic writing by postsecondary students with learning disabilities: A report of three case studies. *Learning Disability Quarterly*, 23(3), 196-213.
- Chevalier, T. M., Parrila, R., Ritchie, K. C., & Deacon, S. H. (2017). The role of metacognitive reading strategies, metacognitive study and learning strategies, and behavioral study and learning strategies in predicting academic success in students with and without a history of reading difficulties. *Journal of Learning Disabilities*, 50, 34-48.
- College Board. (2010). Education pays 2010. Retrieved from <http://trends.collegeboard.org/education-pays>
- *Cooper, J. T., Lingo, A. S., Whitney, T., & Slaton, D. B. (2011). The effects of instruction in a paired associates learning strategy as an intervention for college students with learning disabilities. *Journal of Postsecondary Education and Disability*, 24(2), 138-154.
- Corkett, J. K., Parrila, R., & Hein, S. F. (2006). Learning and study strategies of university students who report a significant history of reading difficulties. *Developmental Disabilities Bulletin*, 34(1&2), 57-79.
- Deshler, D. D., & Schumaker, J. (Eds.). (2006). *Teaching adolescents with disabilities: Accessing the general education curriculum*. Thousand Oaks, CA: Corwin Press.
- Dukes III, L. L. (2006). The process: The development of the revised AHEAD program standards and performance indicators. *Journal of Postsecondary Education and Disability* 19, 5-15.
- Dukes, III, L. L., Madaus, J. W., Faggella-Luby, M., Lombardi, A., & Gelbar, N. (2017). PASSing College: A taxonomy for students with disabilities in postsecondary education. *Journal of Postsecondary Education and Disability*, 30, 113-129.

- Dukes III, L. L., Waring, S., & Koorland, M. A. (2006). The blended course delivery model: The not so distant education. *Journal of Computing in Teacher Education*, 22, 153-158.
- Edmonds, M.S., Vaughn, S., Wexler, J., Reutebuch, C., Cable, A., Klingler Tackett, K., & Wick Schnakenberg, J. (2009). A synthesis of reading interventions and effects on reading comprehension outcomes for older struggling readers. *Review of Educational Research*, 79, 262-300.
- Faggella-Luby, M., Graner, P., Deshler, D., & Drew, S. S. (2012). Building a house on sand: Why disciplinary specific strategies are not sufficient to replace general strategies for adolescent learners who struggle with reading and writing. *Topics in Language Disorders*, 32, 69-84.
- Faggella-Luby, M., Schumaker, J. S., & Deshler, D. D. (2007). Embedded learning strategy instruction: Story-structure pedagogy in heterogeneous secondary literature classes. *Learning Disability Quarterly*, 30, 131-147.
- *Field, S., Parker, D. R., Sawilowsky, S., & Rolands, L. (2013). Assessing the impact of ADHD coaching services on university students' learning skills, self-regulation, and well-being. *Journal of Postsecondary Education and Disability*, 26, 67-81.
- *Floyd, K. K., & Judge, S. L. (2012). The efficacy of assistive technology on reading comprehension for postsecondary students with learning disabilities. *Assistive Technology Outcomes And Benefits*, 8(1), 48-64.
- *Gaddy, S. A., Bakken, J. P., & Fulk, B. M. (2008). The effects of teaching text-structure strategies to postsecondary students with learning disabilities to improve their reading comprehension on expository science text passages. *Journal of Postsecondary Education and Disability*, 20, 100-119.
- *Ghesquiere, P., Laurijssen, J., Ruijsenaars, W., & Onghena, P. (1999). The significance of auditory study to university students who are blind. *Journal of Visual Impairment & Blindness*, 93, 40-45.
- Graham, S., & Perin, D. (2007). A meta-analysis of writing instruction for adolescent students. *Journal of Educational Psychology*, 99, 445-476.
- Graner, P.S., Faggella-Luby, M., & Fritschmann, N. S. (2005). An overview of responsiveness to intervention: What practitioners ought to know. *Topics in Language Disorders*, 25, 93-105.
- *Guyer, B. P., & Sabatino, D. (1989). The effectiveness of a multisensory alphabetic phonetic approach with college students who are learning disabled. *Journal of Learning Disabilities*, 22, 430-434.
- *Hecker, L., Burns, L., Katz, L., Elkind, J., & Elkind, K. (2002). Benefits of assistive reading software for students with attention disorders. *Annals of Dyslexia*, 52, 243-272.
- Henderson, C. (1999). *College freshmen with disabilities: Statistical year 1998*. Washington, DC: American Council on Education.
- Hock, M. F., Brasseur, I. F., Deshler, D. D., Catts, H. W., Marquis, J. G., Mark, C. A., & Stribling, J. W. (2009). What is the reading component skill profile of adolescent struggling readers in urban schools? *Learning Disability Quarterly*, 32, 21-38.
- *Holzer, M. L., Madaus, J. W., Bray, M. A., & Kehle, T. J. (2009). The test-taking strategy intervention for college students with learning disabilities. *Learning Disabilities Research and Practice*, 24(1), 44-56.
- Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single-subject research to identify evidence-based practice in special education. *Exceptional Children*, 71, 165-179.
- Kamil, M. L., Borman, G. D., Dole, J., Kral, C. C., Salinger, T., & Torgesen, J. (2008). *Improving adolescent literacy: Effective classroom and intervention practices: A practice guide* (NCEE #2008-4027). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.
- *Killu, K., Weber, K. P., & McLaughlin, T. F. (2001). An evaluation of repeated readings across various counting periods of see to think, think to say, and think to write channels with a university student with learning disabilities. *Journal of Precision Teaching & Celeration*, 17, 39-57.
- Kirby, J. R., Silvestri, R., Allingham, B. H., Parrila, R., & La Fave, C. B. (2008). Learning strategies and study approaches of postsecondary students with dyslexia. *Journal of Learning Disabilities*, 41, 85-96.
- Kovach, K., & Wilgosh, L. R. (1999). Learning and study strategies and performance anxiety in postsecondary students with learning disabilities: A preliminary study. *Developmental Disabilities Bulletin*, 27, 46-57.
- *Kovach, K., Wilgosh, L. R., & Stewin, L. L. (1998). Dealing with test anxiety and underachievement in postsecondary students with learning disabilities. *Developmental Disabilities Bulletin*, 26, 63-76.
- Labuhn, A. S., Zimmerman, B. J., & Hasselhorn, M. (2010). Enhancing students' self-regulation and mathematics performance: The influence of feedback and self-evaluative standards *Metacognition and Learning*, 5, 173-194.

- Lalor, A., Lombardi, A., Madaus, J.W., Kowitt, J.S., & Dukes III, L.L. (2014, November). *From infancy to adolescence: Research on disability and higher education*. 2014 Division on Career Development and Transition Conference, Cleveland, OH.
- Lombardi, A., Gelbar, N., Dukes III, L. L., Kowitt, J., Wei, Y., Madaus, J. W., Lalor, A., & Faggella-Luby, M. N. (2016, June 23). Assessment instruments designed for students, faculty, and staff related to higher education and disability: A systematic review. *Journal of Diversity Higher Education*. Advance online publication. <http://dx.doi.org/10.1037/dhe0000027>
- Madaus J. W. (2006). Employment outcomes of university graduates with learning disabilities. *Learning Disability Quarterly*, 29, 19–31.
- Madaus, J. W., Gelbar, N., Dukes III, L. L., Lalor, A. R., Lombardi, A., Kowitt, J., & Faggella-Luby, M. N. (2016, September 15). Literature on post-secondary disability services: A call for research guidelines. *Journal of Diversity in Higher Education*. Advance online publication. <http://dx.doi.org/10.1037/dhe0000045>
- Maggin, D. M., & Chafouleas, S. M. (2013). Introduction to the special series: Issues and advances of synthesizing single-case research. *Remedial & Special Education*, 34, 3-8.
- McGuire, J. M. (2002). Policies, procedures, and programmatic considerations. In L. C. Brinkerhoff, J. M. McGuire, & S. F. Shaw, (Eds.). *Postsecondary education and transition for students with learning disabilities* (2nd ed.; pp. 247-293). Austin, TX: Pro-Ed.
- McGuire, J. M., Hall, D., & Litt, A. V. (1991). A field-based study of the direct service needs of college students with learning disabilities. *Journal of College Student Development*, 32, 101-108.
- *Millar, D. C., McNaughton, D. B., & Light, J. C. (2005). A comparison of accuracy and rate of transcription by adults with learning disabilities using a continuous speech recognition system and a traditional computer keyboard. *Journal of Postsecondary Education and Disability*, 18, 1-16.
- *Mytkowicz, P., Goss, D., & Steinberg, B. (2014). Assessing metacognition as a learning outcome in a postsecondary strategic learning course. *Journal of Postsecondary Education and Disability*, 27, 51-62.
- Newman, L., Wagner M., Cameto R., & Knokey A. M. (2009). *The post-high school outcomes of youth with disabilities up to 4 years after high school. A report of findings from the National Longitudinal Transition Study-2 (NLTS2) (NCSE 2009-3017)*. Menlo Park, CA: SRI International.
- Newman, L., Wagner, M., Knokey, A. -M., Marder, C., Nagle, K., Shaver, D., Wei, X., with Cameto, R., Contreras, E., Ferguson, K., Greene, S., & Schwarting, M. (2011). *The post-high school outcomes of young adults with disabilities up to 8 years after high school. A report from the National Longitudinal Transition Study-2 (NLTS2) (NCSE 2011-3005)*. Menlo Park, CA: SRI International.
- O'Neill, L. N. P., Markward, M. J., French, J. P. (2012). Predictors of graduation among college students with disabilities. *Journal of Postsecondary Education and Disability*, 25(1), 21–36.
- *Patwa, S. S., Chafouleas, S. M., & Madaus, J. W. (2005). The effects of the paired associates strategy (pas) on the recall of factual information by postsecondary students with learning disabilities. *School Psychology Review*, 34, 556-570.
- Peña, E. V. (2014). Marginalization of published scholarship on students with disabilities in higher education journals. *Journal of College Student Development*, 55, 30–40.
- *Reed, M. J., Kennett, D. J., Lewis, T., & Lund-Lucas, E. (2011). The relative benefits found for students with and without learning disabilities taking a first-year university preparation course. *Active Learning in Higher Education*, 12, 133-142.
- Rehabilitation Act of 1973, Section 504, P. L. 93–112, 29 U.S. C. §794 (1977).
- Rogers, L. A., & Graham, S. (2008). A meta-analysis of single subject design writing intervention research. *Journal of Educational Psychology*, 100, 879–906.
- Scheuermann, A. M., Harris, M. L., Faggella-Luby, M. N., Fritschmann, N. S., Graner, P. G., & Deshler, D. D. (2009). Closing the performance gap: Learning strategies instruction for adolescents with learning disabilities. In G. Sideridis & T. Citro (Eds.) *Classroom strategies for struggling learners* (pp.49-78). Weston, MA: Learning Disabilities Worldwide.
- *Schmitt, A. J., McCallum, E., Hennessey, J., Lovelace, T., & Hawkins, R. O. (2012). Use of reading pen assistive technology to accommodate post-secondary students with reading disabilities. *Assistive Technology*, 24, 229-239.
- Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology*, 19, 460-475.
- Schumaker, J. B., & Deshler, D. D. (1992). Validation of learning strategy interventions for students with learning disabilities: Results of a programmatic research effort. In B. Y. L. Wong (Ed.), *Contemporary intervention research in learning disabilities: An international perspective*. New York: Springer-Verlag.

- Schunk, D., & Zimmerman, B. (2007). Influencing children's self-efficacy and self-regulation of reading and writing through modeling. *Reading & Writing Quarterly*, 23, 7-25.
- Shaw, S. A., Byron, J., Norlander, K. A., McGuire, J. M., & Anderson, P. L. (1988). Preparing learning disabled students for college. In L. Weinger (Ed.), *Issues in college learning centers*, 6, 2-14.
- Shaw, S. F., & Dukes III, L. L. (2006). Postsecondary disability program standards and performance indicators: Minimum essentials for the office for students with disabilities. *Journal of Postsecondary Education and Disability*, 19, 16-26.
- Shaw, S. F., & Dukes III, L. L. (2013). Transition to postsecondary education: A call for evidence-based practice. *Career Development and Transition for Exceptional Individuals*, 36, 51-57.
- Shaw, S. F., Madaus, J. W., & Dukes III, L. L. (Eds.). (2010). *Preparing students with disabilities for college: A practical guide for transition planning*. Baltimore: Paul E. Brookes Publishing.
- Skinner, M. E. (2004). College students with learning disabilities speak out: What it takes to be successful in postsecondary education. *Journal of Postsecondary Education and Disability*, 17, 91-104.
- *Tanners, A., McDougall, D., Skouge, J., & Narkon, D. (2012). Comprehension and Time Expended for a Doctoral Student with a Learning Disability when Reading with and without an Accommodation. *Learning Disabilities: A Multidisciplinary Journal*, 18, 3-10.
- Taraban, R., Rynearson, K., & Kerr, M. (2000). College students' academic performance and self-reports of comprehension strategy use. *Reading Psychology*, 21, 283-308.
- Test, D. W., Fowler, C. H., Richter, S. M., Mazzotti, V., White, J., Walker, A. R., Kohler, P., & Korterling, L. (2009). Evidence-based practices in secondary transition. *Career Development for Exceptional Individuals*, 32, 155-128.
- *Tuncer, A., & Altunay, B. (2006). The Effect of a Summarization-Based Cumulative Retelling Strategy on Listening Comprehension of College Students with Visual Impairments. *Journal of Visual Impairment & Blindness*, 100, 353-365.
- U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse. (2014, March). *What works clearinghouse: procedures and standards handbook* (Version 3.0). Retrieved from <http://whatworks.ed.gov>.
- U.S. Department of Education, National Center for Education Statistics. (2015). *Digest of Education Statistics, 2013* (2015-011). Retrieved from <https://nces.ed.gov/fastfacts/display.asp?id60>
- Wagner, M., Newman L., Cameto, R., Levine P., & Marder, C. (2007). *Perceptions and expectations of youth with disabilities. A special topic report of findings from the National Longitudinal Transition Study-2 (NLTS2)* (NCSE 2007-3006). Washington, DC: National Center for Special Education Research.
- Wanzek, J., Wexler, J., Vaughn, S., & Ciullo, S. (2010). Reading interventions for struggling readers in the upper elementary grades: A synthesis of 20 years of research. *Reading and Writing: An Interdisciplinary Journal*, 23, 889-912.
- Weinstein, C. E., Palmer, D. R., & Shulte, A. C. (2002). *LASSI user's manual* (2nd ed.). Clearwater, FL: H & H.
- Weinstein, C. E., Schutte, A. C., & Palmer, D. P. (1987). *Learning and Study Strategies Inventory*, (LASSI). Clearwater, FL: H & H Publishing.
- Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, 81, 329-339.
- Zimmerman, B. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal*, 45, 166-183.
- *Zwart, L. M., & Kallemeyn, L. M. (2001). Peer-based coaching for college students with ADHD and learning disabilities. *Journal of Postsecondary Education and Disability*, 15, 1-15.

* indicates articles reviewed as empirical studies in this review (group or single case design).

About the Authors

Michael Faggella-Luby received his B.A. degree in English from College of the Holy Cross, M.Ed. in secondary education from the University of Notre Dame, and Ph.D. from the University of Kansas. His experience includes working as a teacher of both English and chemistry as well as serving as a school administrator in Jacksonville, FL. He is currently an associate professor in the College of Education at Texas Christian University where he is director of the Alice Neeley Special Education Research & Service (ANSERS) Institute. His research interests include embedding learning strategies during content area instruction in both secondary and postsecondary environments. He can be reached by email at: m.faggella-luby@tcu.edu.

Nicholas Gelbar earned his B.S. degree in Social Studies Education and Ph.D. in Educational Psychology with a concentration in School Psychology from the University of Connecticut. He has worked as both a secondary teacher and a school/clinical psychologist providing diagnostic assessments for Autism. Currently, he is an assistant professor in the Department of Community Medicine and Health Care at the University of Connecticut School of Medicine and also serves as the Research Director for the University Center for Excellence in Developmental Disabilities. His research interests involve improving the transition from high school to college for individuals with Autism Spectrum Disorder. He can be reached at gelbar@uchc.edu.

Dr. Lyman L. Dukes III, is a Professor of Special Education, Program Coordinator, and Graduate Program Advisor at the University of South Florida St. Petersburg with 25 years of educational experience. He earned his B.S. in psychology and M.A. degree in special education at the University of Florida and his Ph.D. at the University of Connecticut. He has published and presented extensively on topics related to secondary and postsecondary education for students with disabilities. His current research interests include transition from secondary school to college life, inclusive postsecondary education, organizational frameworks for postsecondary education and disability, and guidelines for research on students with disabilities in higher education. He can be reached via email at: ldukes@usfsp.edu.

Joseph W. Madaus, Ph.D., is the Associate Dean for Academic Affairs, the Director of the Center on Postsecondary Education and Disability, and a Professor in the Department of Educational Psychology in the Neag School of Education at the University of Connecticut. His research and publication interests include postsecondary education, transition, assessment and postschool outcomes of adults with disabilities. Address: Joseph W. Madaus, Neag School of Education, 249 Glenbrook Road, Unit 2064, Storrs, CT 06269; email joseph.madaus@uconn.edu.

Dr. Adam R. Lalor, is Lead Education Specialist at Landmark College. He received his B.A. degree in psychology from Hamilton College, M.Ed. in Educational Policy, Planning, and Leadership from the College of William and Mary, and Ph.D. in Educational Psychology from the University of Connecticut. He has more than a decade of experience working as a higher education administrator and publishes and presents on topics related to transition of students with disabilities to and within higher education. His current research focuses on the preparation of faculty and college administrators to serve students with disabilities. He can be reached via email at: adamlalor@landmark.edu.

Allison Lombardi received her B.A. degree in English Literature and her M.A. degree in Education from the University of California, Berkeley, and Ph.D. from the University of Oregon. She is currently an Associate Professor in the Department of Educational Psychology at the University of Connecticut. Her research interests include college and career readiness for students with disabilities and promoting inclusive instruction among university faculty. She can be reached by email at: allison.lombardi@uconn.edu.

Table 1

Number of Studies by Study Type

Characteristic	<i>n</i>
Group	10
One group counterbalanced	2
One shot case study	1
One group pre/post	3
Static group comparison	2
RCT	2
Characteristic	
Only researcher developed measures	2
Comparison group	8
Established baseline equivalence	3
Included non-disabled peers	3
Single Subject	11
A-B	2
B-C	1
ABAC	1
Alternating treatments	3
Multiple baseline	4
With probes	2

Table 2

Since Case Design Studies

-
- Butler, D. L. (1998). The strategic content learning approach to promoting self-regulated learning: A report of three studies. *Journal of Educational Psychology, 90*, 682-697.
- Butler, D. L., Elaschuk, C. L., & Poole, S. (2000). Promoting strategic writing by postsecondary students with learning disabilities: A report of three case studies. *Learning Disability Quarterly, 23*, 196-213.
- Cooper, J. T., Lingo, A. S., Whitney, T., & Slaton, D. B. (2011). The effects of instruction in a paired associates learning strategy as an intervention for college students with learning disabilities. *Journal of Postsecondary Education and Disability, 24*, 138-154.
- Floyd, K. K., & Judge, S. L. (2012). The efficacy of assistive technology on reading comprehension for post-secondary students with learning disabilities. *Assistive Technology Outcomes And Benefits, 8*, 48-64.
- Holzer, M. L., Madaus, J. W., Bray, M. A., & Kehle, T. J. (2009). The test-taking strategy intervention for college students with learning disabilities. *Learning Disabilities Research and Practice, 24*, 44-56.
- Killu, K., Weber, K. P., & McLaughlin, T. F. (2001). An evaluation of repeated readings across various counting periods of see to think, think to say, and think to write channels with a university student with learning disabilities. *Journal of Precision Teaching & Celebration, 17*, 39-57.
- Millar, D. C., McNaughton, D. B., & Light, J. C. (2005). A comparison of accuracy and rate of transcription by adults with learning disabilities using a continuous speech recognition system and a traditional computer keyboard. *Journal of Postsecondary Education and Disability, 18*, 1-16.
- Patwa, S. S., Chafouleas, S. M., & Madaus, J. W. (2005). The effects of the Paired Associates Strategy (PAS) on the recall of factual information by postsecondary students with learning disabilities. *School Psychology Review, 34*, 556-570.
- Schmitt, A. J., McCallum, E., Hennessey, J., Lovelace, T., & Hawkins, R. O. (2012). Use of reading pen assistive technology to accommodate post-secondary students with reading disabilities. *Assistive Technology, 24*, 229-239.
- Tanners, A., McDougall, D., Skouge, J., & Narkon, D. (2012). Comprehension and time expended for a doctoral student with a learning disability when reading with and without an accommodation. *Learning Disabilities: A Multidisciplinary Journal, 18*, 3-10.
- Tuncer, A., & Altunay, B. (2006). The effect of a summarization-based cumulative retelling strategy on listening comprehension of college students with visual impairments. *Journal of Visual Impairment & Blindness, 100*, 353-365.
-

Table 3

Demographic Characteristics by Study Type

Location	Single Subject	Group	Total
U.S.	8	7	15
Canada	2	2	4
Other international	1	1	2
Setting			
4-year college or university	7	5	12
Graduate program	1	0	1
2-year college or university	0	3	3
International institution	3	3	6
Demographics present			
Race/ethnicity	2	2	4
Disability category	11	8	19
Learning disability	10	5	15
ADHD	1	3	4
Visual impairment	0	1	1
Multiple disabilities	1	0	1
Other	0	1	1
Without disabilities	0	3	3
Class standing	6	3	9
Gender	10	5	15

Table 4

Intervention and Pedagogical Variables by Type of Research

Characteristic	Single subject (n)	Group (n)	Total (n)
Type of strategy			
Acquisition	7	8	15
Storage	3	6	9
Expression	5	7	12
Process	2	3	5
Mechanics	1	1	2
Genre	0	3	3
Test-taking	2	2	4
Executive function coaching	0	1	1
Intervention			
Word-level reading	5	2	7
Learning strategy course	0	3	3
Coaching	0	2	2
Reading strategy instruction	1	1	2
Metacognitive strategies	2	0	2
Mnemonics	2	0	2
Test preparation	1	1	2
Listening	0	1	1
Number of students per instructor			
1:1	6	4	10
1:2-9	3	2	5
1:10+	2	0	2
Not clear	2	2	4
Setting			
Face to face	9	10	19
Phone	0	1	1
Online	1	0	1
Not described	1	0	1

Table 5

Empirical Studies with Group Design

Citation	Location	Control/ Comparison Group	Intervention	Students per Instructor Ratio	Team Member	n	Researcher- Developed Measures
Burchand & Swerdzewski, 2009	U.S.	Yes	Orton-Gillingham	10:1	No	30	No
Field, Parker, Sawilowsky, & Rolands, 2013	U.S.	Yes*	Study skills	1:1 or small groups	Yes	33	Yes
Gaddy, Bakken, & Fulk, 2008	U.S.	Yes*	Auditory vs tactile strategies	3:1	Yes	12	No
Ghesquiere & Laurijssen, 1999	Belgium	Yes	Peer-based Coaching	1:1	No	42	No
Guyer & Sabatino, 1989	U.S.	No	Text to speech software	1-4:1	Yes	20	No
Hecker, Burns, Elkind, Elkind, & Katz, 2002	U.S.	Yes	Text-structure strategies	1:1	Yes	40	Yes
Kovach, Wilgosh, & Stewin, 1998	Canada	Yes	Strategic learning course	16-27:1	Yes	78	No
Mytkowicz, Goss, & Steinberg, 2014	U.S.	Yes	University first year course	Not clear	Yes	41	No
Reed, Kennett, Lewis, & Lund-Lucas, 2011	Canada	No	Strategic learning course	Not clear	Yes	48	No
Zwart & Kallemeyn, 2001	U.S.	Yes	Executive function coaching	1:1	Yes	160	No

Note. *Utilized a RCT design