Given the increase in the number of students with ASD in inclusive classrooms, these students’ documented challenges in mathematical understanding and problem solving, and the importance of conceptual understanding and problem solving across skill areas, teachers need practical and easily implemented evidence-based strategies to help them address such mathematical deficits. Herein we present how visual supports, an evidence-based practice, can be implemented in the context of teaching algebraic problem solving specifically to students with ASD.

Visual Supports

Visual supports—an evidence-based practice for assisting students in understanding mathematical concepts and ideas (Strickland & Maccini, 2010)—are composed of concrete cues that provide information about an activity, routine, expectation, or skill. Students are introduced to a picture, diagram, chart, or other visual aid that has been developed to support them in achieving a specific academic skill. Incorporating such visuals and other concrete supports assists individuals with ASD whose strengths include processing visual and/or written information (Marans, Rubin, & Laurent, 2005).

Creating an acronym to which students can refer during classroom activities and independent problem solving effectively assists students as they acquire algebraic skills. Further, creating a picture or graphic in conjunction with an acronym is a useful way for teachers to utilize visual supports to enhance the learning of challenging mathematical concepts, including algebra, because doing so builds the conceptual understanding necessary for success at the symbolic or abstract level (Strickland & Maccini, 2010). Graphic and pictorial representations will visually support students in memorizing ideas and steps, helping them to be successful in remembering concepts long term. Furthermore, visual cues can augment receptive/expressive communication during an activity and increase independence in a given task among students with ASD (Koegel, Koegel, & Parks, 1995).

Visual Supports in Algebraic Problem Solving

When teaching students with ASD how to solve algebraic problems (e.g., \(2x + 8 = 20\)), an acronym that represents the steps of solving this type of mathematics problem is key. An acronym for solving one-variable linear equations is COSMIC. This
(Teachers’ Corner, continued from page 1)

The acronym is based on traditionally accepted algebraic problem-solving procedures in the mathematics literature (Kieran, 2006). The steps represented by each letter of the acronym are described by the visual aid shown in Figure 1. Using this graphic, teachers can organize complex information into simple, clear sections that are easy to grasp or understand. Additionally, fun, engaging pictures can help students better memorize the content being taught.

After students are introduced to the acronym and are taught the essential vocabulary represented in it, they can initially be allowed to utilize the figure as a visual support that can cue them to the required steps of solving one-variable linear equations. COSMIC is also a helpful mnemonic device that can assist students in recalling the specific steps of the problem-solving process. Mnemonic devices are learning strategies that enhance memory and improve recall. They come in the form of acronyms, pictures, or key words intended to be easier to remember than the word or concept they stand for (Hart & Whalon, 2008). Figure 2 provides a sample checklist where students can check off each step as it is completed to monitor progress, maintain attention to the task, and solve the problem.

**COSMIC**

- Copy down the problem
- Operation of addition or subtraction needed to isolate the variable
- Subtract or add constant from each side of the equation
- Multiply or divide to remove the coefficient of the variable
- Isolate the variable
- Circle your answer

**Figure 1.** Visual support acronym for algebraic problem-solving steps. Each letter of the word COSMIC is a different color and the statements are individually colored to match the letter of the acronym with which they start (e.g., C of COSMIC is red, so the first statement, “Copy down the problem” is red).

**Figure 2.** Algebraic Problem-Solving Checklist.

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**Conclusion**

All teachers require evidence-based practices to meet the academic needs of their students; teachers of students with ASD are no exception. Visual supports are beneficial in aiding students with autism spectrum disorders to comprehend challenging material, including higher-order mathematics. Such supports help students to organize complex information into simpler, clear sections that are easy to understand and prepare them for more rigorous content.

**References**


President’s Message
E. Amanda Boutot

As 2014 comes to a close, we are looking forward to a new year. It’s hard to believe that my year as your president has already come and gone! What a year it has been! We held a very successful and informative DADD Conference in Clearwater Beach, Florida, last January and for the first time were able to provide BCBA Continuing Education Units, along with our usual CEUs for teachers (we will continue offering both kinds of CEUs this year, so mark your calendars!). At the CEC Convention in Philadelphia we showcased some distinguished faculty members from around the country on our DADD Showcase Panel and featured some exemplary speakers in our more than 80 sessions on autism and developmental disabilities. The Board of Directors saw the official changing of the guard, with Dr. Tom Smith stepping down after a long and prestigious tenure as our executive director, and Dr. Teresa Taber Doughty taking the reins in January. We successfully changed our bylaws to move from regional representatives to members-at-large positions. We also saw some improvements in our DADD Express, by offering new and informative sections in each issue. We also are welcoming new Board members Jenny Root (Student Representative), Beth Kavanaugh (Canadian Representative), and Elizabeth West as your new Vice President. Welcome and congratulations to all three of you!

Yes, it has been an exciting year, and it has gone by very quickly! Next month we will return to Clearwater Beach for another DADD Conference, which promises to be as innovative and informative as the last, with focused topic areas such as ethical treatment of challenging behavior, technology, literacy and numeracy, and more. Before you know it, we will be back at CEC (this time in sunny San Diego) to enjoy the more than 70-plus autism and developmental disabilities sessions on the program. I wish to publicly thank those individuals who have made my tenure as president of DADD an enjoyable and smooth experience. First, Nikki Murdick, for being such a good (and patient!) role model and predecessor; she made it look easy! I wish you luck, Nikki, as you exit the Board; you will be missed! I wish to also thank the Board of Directors as a whole, Executive Director Teresa Taber Doughty, and especially the Executive Board, for their patience and encouragement. It is such a wonderful thing to enjoy the people you work with, and you all made it fun to “go to work” wherever we happened to be! I would be remiss if I did not also thank former Board members who have served as mentors and friends over the years; your kindnesses have not gone unnoticed. Finally, in particular, I wish to thank you, the membership, for your continued enthusiasm in what you do! This Division is here for you, its members, to support you in doing the best job you can for children and youth with autism and developmental disabilities. It has been a true pleasure to serve you. As I prepare for the “passing of the gavel,” I am reminded that another of my personal and professional role models is your incoming president, Dianne Zager. Dianne has the passion, knowledge, and experience that have made her a true leader in our field. As I step down, I will leave you in her more than capable hands. Best of luck, Dianne! And I’ll see everyone at DADD in January.

All the best,
Amanda Boutot

Editor’s Note
Ginevra Courtade

This issue marks the end of contributions from E. Amanda Boutot and Leah Wood in their respective roles as president and student representative. Thank you to each of you for your contributions to DADD Express over this past year!

Do you have a great idea for teachers in the field? Every issue of DADD Express includes a Teachers’ Corner article. If you would like to contribute information that would be beneficial to teachers, please contact me with ideas or questions (g.courtade@louisville.edu). We are also looking forward to more submissions for our Evidence-based Practices and Law Briefs sections. Enjoy the winter!

Communications Committee News
Emily Bouck
Chairperson

DADD members, please remember that our new website (http://daddcec.org) allows members to log in to access members-only materials (e.g., the ETADD journal). Be sure to visit our website for important information about conferences and other division activities. We also encourage DADD members to find us on Facebook (search for Division on Autism and Developmental Disabilities). DADD is on Twitter (follow DADD_CEC). If members have suggestions for other materials for the website or ways we can better communicate with the you, please contact me (bouck@purdue.edu).
In discussions of evidence-based practices, not only must the practice be clearly described but also the discussion should indicate for whom it is intended and under what conditions it has been established to be effective. In this brief we describe the instructional strategy of Constant Time Delay (CTD) and its utility for teaching students with severe disabilities (i.e., individuals with moderate and severe intellectual disability, autism spectrum disorders, and multiple disabilities) the literacy skills related to vocabulary and sight word identification. We will clearly outline the practice and how it was determined to be evidence based, as well as provide strategies for its use within the classroom.

What Is the Practice?
The CTD procedure is a systematic and errorless instructional strategy (Snell & Gast, 1981). It has a documented history of effectiveness in teaching both chained (Schuster et al., 1998) and discrete (Wolery et al., 1992) responses. CTD is an appropriate instructional strategy for students who have a wait response, a necessary component of the instructional strategy (Collins, 2012). In CTD, two delay intervals are used. First, teachers use a 0-s delay, meaning a controlling prompt is delivered immediately after the task direction. The next delay, which is inserted between the task direction and the prompt, is the amount of time that the instructor believes the student needs for “wait time” (e.g., 3 or 4 seconds) before the teacher provides the controlling prompt. If students make an incorrect response, an additional 0-s round is often repeated and the student is told, “If you do not know, wait and I will help you.” In its first applied investigation, Touchette (1971) found learning occurred with few to no errors, resulting in CTD being termed an “errorless learning” procedure.

What Evidence Supports the Use of CTD?
A review of the literature on time delay conducted by Browder, Ahlgrim-DelzELL, Spooner, Mims, and Baker (2009) evaluated the evidence base for using the instructional procedure to teach literacy to students with severe disabilities. Using the Horner et al. (2005) criteria for single-subject design research, Browder et al. found time delay to be an evidence-based practice for teaching picture and sight word recognition. A total of 30 experiments met the original inclusion criteria, with 22 experiments meeting all of the Horner et al. quality indicators for high quality studies. Of these 22 experiments, 11 used CTD, far exceeding the required 5 to establish an evidence-based practice.

How Teachers Can Use CTD in Classrooms
Teachers can use CTD in the classroom to teach a variety of vocabulary and concepts to students with disabilities. The utility of the instructional practice is worth exploration: it can be employed to give students access to pivotal concepts and skills across many content areas. Literacy is not a stand-alone subject that is only addressed in Language Arts; students need to master it to meaningfully participate in all areas of academics, vocational and leisure skills, and communication.

Access to Academics
Knowledge of vocabulary and definitions is often a prerequisite for more advanced learning, such as discrimination between concepts and using conceptual models or graphic organizers. Pre-teaching vocabulary and concepts using CTD can give students with disabilities access to the general curriculum content and reduce cognitive load during more difficult academic tasks. For example, Knight, Spooner, Browder, Smith, and Wood (2013) used CTD to pre-teach science vocabulary and definitions related to the water cycle to middle school students with autism and intellectual disability. Following acquisition of definitions, students were taught to discriminate vocabulary words by sorting them on a T-chart and then placing them on a graphic organizer depicting where they belong on the water cycle.

Benefits Across Content Areas and Settings
CTD can be embedded in the general education setting and taught in massed trials in the special education setting to teach academic, vocational, and functional vocabulary. Jameson, McDonnell, Johnson, Riesen, and Polychronis (2007) taught four middle school students with intellectual disability different targeted vocabulary words and concepts across content areas. Targeted vocabulary addressed cooking, fashion, states of matter, and teen living content. Both embedded instruction in the general education classroom and massed trials in the special education setting were effective for all participants.

(continued on page 5)
Maximize Observational Learning

Teachers can use technology to enhance the utility of the CTD procedure, and students can benefit from observational learning when taught in small groups. Mechling, Gast, and Krupa (2007) taught three adults with moderate intellectual disability to read unknown multi-syllabic and compound grocery words. The words were presented on a SMART Board using Microsoft PowerPoint and were taught using CTD in a small-group setting. Although each student was only taught his or her own set of vocabulary words, each student demonstrated mastery on both the targeted words and their peers’ vocabulary words.

Conclusion

Teachers should consider the vocabulary prerequisites of academic learning targets across content areas and use CTD to give their students access to the content. This instructional strategy can be delivered in a variety of settings or trial formats, including group instruction. Given the status of CTD as an evidence-based practice to teach literacy to students with severe disabilities (Browder et al., 2009), teachers should use this powerful technology to teach their students vocabulary and concepts.

References


DADD Online Journal Coming in December

The inaugural issue of the DADD Online Journal will be coming out in December on the DADD website. It will be devoted to papers from the DADD 2014 Clearwater Conference. The following individuals have taken on staff and guest editor responsibilities:

Editor: Stan Zucker
Associate Editors: Emily Bouck, Juliet Hart Barnett
Guest Editors, this issue: Cindy Perras, Ginevra Courtade, E. Amanda Boutot
Look forward to the additional knowledge I will gain as I learn to better teach and prepare educators and improve the lives of individuals with disabilities. For me, no longer being a student means finally feeling comfortable and competent enough to accept and even welcome that responsibility.

Such responsibilities apply to graduates at any level of higher education. Students who earn their initial teaching license are transitioning from student to teacher and accepting the responsibility to enrich the lives of their students. Students who continue their education and earn a master’s degree will experience the shift from student to master teacher. Someone who holds this degree is accepting the responsibility to enrich the lives of their students even more, with greater knowledge and skills than before, and they are accepting the expectation for even greater student outcomes. Finally, graduates of doctoral programs face the incredible responsibility of providing quality education and training to teachers and contributing to our collective understanding of the field through scholarship and research. My message is that I hope we all take the role of “student” very seriously. More so, I hope we fully acknowledge and accept the responsibility that comes with earning any degree in special education. Finally, I hope that we all embrace continued learning and seek knowledge throughout our entire lives, long after we have transitioned from our student roles. It has been a great pleasure serving as the student governor for DADD. Thank you for the opportunity and the knowledge gained. I am grateful to share this responsibility to make an impact with so many other dedicated students (soon-to-be former students). Please keep in touch. My new email address is awood17@calpoly.edu.

No longer being a student means a tremendous shift in responsibilities, of course. I welcome these responsibilities and look forward to the additional knowledge I will gain as I learn to better teach and prepare educators and improve the lives of individuals with disabilities. For me, no longer being a student means finally feeling comfortable and competent enough to accept and even welcome that responsibility.

Such responsibilities apply to graduates at any level of higher education. Students who earn their initial teaching license are transitioning from student to teacher and accepting the responsibility to enrich the lives of their students. Students who continue their education and earn a master’s degree will experience the shift from student to master teacher. Someone who holds this degree is accepting the responsibility to enrich the lives of their students even more, with greater knowledge and skills than before, and they are accepting the expectation for even greater student outcomes. Finally, graduates of doctoral programs face the incredible responsibility of providing quality education and training to teachers and contributing to our collective understanding of the field through scholarship and research. My message is that I hope we all take the role of “student” very seriously. More so, I hope we fully acknowledge and accept the responsibility that comes with earning any degree in special education. Finally, I hope that we all embrace continued learning and seek knowledge throughout our entire lives, long after we have transitioned from our student roles. It has been a great pleasure serving as the student governor for DADD. Thank you for the opportunity and the knowledge gained. I am grateful to share this responsibility to make an impact with so many other dedicated students (soon-to-be former students). Please keep in touch. My new email address is awood17@calpoly.edu.

Join a DADD Committee!

Please contact the chair of any committee you may be interested in joining. See the DADD website page for information about each committee: http://daddcec.org/AboutUs/Committees.aspx

**Awards**
Chair: Dagny Fidler (dagny@mchsi.com)

**Communications**
Chair: Emily Bouck (bouck@purdue.edu)

**Conference**
Co-Chairs: Cindy Perras (cindy.perras@cogeco.ca)
Diane Zager (dzager@pace.edu)

**Critical Issues/Legislative**
Chair: Emily Bouck (bouck@purdue.edu)

**Diversity**
Chair: Debra Cote (dcote@fullerton.edu)

**Finance**
Chair: Gardner Umbarger (gumbarger@woh.rr.com)

**Membership & Unit Development**
Chair: Angi Stone-McDonald (angela.stone@umb.edu)

**Nominations & Standards**
Chair: Nikki Murdick (murdickn@slu.edu)

**Professional Development and Professional Standards**
Chair: Scott Sparks (sparks@oak.cats.ohiou.edu)

**Publications**
Chair: Michael Wehmeyer (wehmeyer@ku.edu)
Executive Director’s Corner

Teresa Taber Doughty

Next month (January), we will be enjoying our annual DADD conference in Clearwater, Florida! We are excited to return to this sunny location for a second year as we engage in more than 100 lecture and poster presentations focused on research-based practices in autism and intellectual and developmental disabilities. Our conference coordinator, Cindy Perras, once again used her amazing talents to organize two very impactful pre-conference training institutes on January 21: Institute 1—Autism Spectrum Disorder and Institute 2—Technology Supports for Literacy and Numeracy Skill Development. The following 2-day conference will feature renowned speakers in the field, keynote presentations, poster presentations, and exhibitor displays. Not only do you have an opportunity to interact with professional colleagues and earn BCBA CEUs in designated sessions but also to enjoy the beauty of a resort location!

I also wanted to take this time to welcome new and returning members to our DADD board. Elizabeth West was recently elected as our new vice president. Jenny Root, a doctoral student at the University of North Carolina—Charlotte, was also elected as our new student representative. And, we are excited that Beth Kavanaugh will continue as our Canadian representative, returning for a second term! Welcome to each of you as we embark on a new year.

Finally, we are always looking to grow DADD in terms of our membership, subdivisions, professional advocacy, and services to individuals with autism and developmental disabilities. If you are interested in starting a new subdivision (or renewing one that previously existed in your state/province), please contact me (tabert@purdue.edu) or our membership chair, Angela Stone-MacDonald (angela.stone@umb.edu), for more information. If you are interested in serving on a DADD committee, contact our committee chairs (see p. 6), and attend these meetings. We are here to serve and provide support.

Happy New Year, and we look forward to seeing you in Clearwater and/or in San Diego for the international CEC conference in April.

Awards Nominations Reminder

The deadline for nominations for any award is

JANUARY 15th!

We are looking for nominations for the following:

- Teacher of the Year
- Para-Educator of the Year
- Shriver–Kennedy Student Achievement Award
- Burton Blatt Humanitarian Award
- Legislative Award
- Research Award

Nominate someone you know or yourself.

Send a letter of nomination for each person to:

Dagny Fidler
Awards Committee Chair
Email: dagny@mchsi.com
or by mail: 1730 Hilltop Circle, Pleasant Hill, IA 50327
On behalf of the Board of Directors for CEC’s Division on Autism and Developmental Disabilities (DADD), may I extend an invitation to join us in Clearwater Beach, Florida, January 21–23, 2015!

“Research-Informed Practice,” DADD’s 16th International Conference on Autism, Intellectual Disability, and Developmental Disabilities, will integrate research and practice, reflecting the need for evidence-based and practice-informed strategies and interventions within this diverse field. Topical areas include:

- Autism Spectrum Disorder
- Assistive & Adaptive Technology
- Early Childhood
- Intellectual Disability
- Mental Health
- Multiple Disabilities
- Paraprofessionals
- Employment
- Post-Secondary
- Transitions

The program features more than 100 lecture and poster presentations; conference delegates may also attend one of two in-depth pre-conference training institutes on either autism spectrum disorder (ASD) or technology. CEC Professional Development Hours (PDHs) will be available for all conference sessions and the pre-conference training institutes; BCBA CEUs will be available for designated sessions on the program and for the pre-conference training institute on ASD. Note: CEC PDHs count toward maintenance of the ASHA Certificate of Clinical Competence.

Our conference will be held at the Sheraton Sand Key Resort in Clearwater Beach, near Tampa, Florida.

For further information, please contact:

Cindy Perras
Conference Co-ordinator
CEC-DADD
cindy.perras@cogeco.ca