It is not uncommon to hear both children and adults proudly proclaim their lack of skill in math. “I am not very good at math,” seems to be a socially acceptable statement. Students say it, parents say it, even teachers say it, and then we all laugh about it. Studies have shown that attitudes and social forces do have an impact in academic performance, particularly in mathematics, whether that influence is coming from parents (Soni & Kumari, 2017) or teachers (Beilock, Gunderson, Ramirez, Levine, & Smith, 2010). As special educators, we have to work to combat this societal acceptance of math phobia and employ specific strategies to help students with learning disabilities in math (MD) become proficient in a topic that may be a source of anxiety.

Students with MD often display poor attitudes toward mathematics. Studies have determined that these struggles often begin as early as first grade, with a negative relationship between attitude and achievement observed across all grade levels (Ma, 1999). Given the link between attitudes and performance in math, it is imperative for special educators to recognize the role teachers play in creating positive and negative learning experiences in math, and how powerful and memorable those experience are for students.

Teacher Skill and Attitudes

Numerous studies show that teacher content knowledge holds more power than curriculum or methods, and directly affects student outcomes (Hill, Rowan, & Ball, 2005, National Mathematics Advisory Panel, 2008; Good, 1979). Teachers need a high level of mathematical understanding in order to recognize student misunderstanding and analyze student errors (Shields, 2005) then respond quickly with corrective feedback and appropriate practice opportunities.

Content preparation in special education is unique when compared to general education. Many states license special education teachers K-12, without emphasis or focus on a specific content area (i.e. math, reading, science). This means that special education teachers could support learners in a range of mathematical content areas, from early numeracy skills to high school algebra, and many do so after taking only one or two math courses, required as part of a teacher preparation program. It is a challenge for special educators to become highly skilled in all areas of mathematics, but it is also a matter of professional obligation to reach a level of minimal mathematical competency and to work toward deeper content knowledge across grade levels (Humphrey & Hourcade, 2010).

continued on page 2
Effective Strategies to Improve Math Attitudes

Personal Math Stories

When working with both preservice and in-service special education teachers, to improve their math instruction, I often start with an activity where participants write their own math stories regarding experiences they remember most in math. Participants report that their negative feelings regarding math are vividly tied to specific educational interactions. This activity is used to demonstrate how much a teacher can influence a student’s attitude toward math well into adulthood. Here are a few quotes from those math stories.

“She made you feel so dumb for asking a question.”

“I failed math, my only F ever. So I had to take a credit recovery class, which was all hands on, and I passed with flying colors.”

“Math made me cry, because once I got home, I couldn’t remember how to do the ‘tricks’ the teacher taught us.”

“I kept asking the same question, because I did not understand, and the teacher just kept giving the same explanation, so I just gave up.”

Some common themes are revealed throughout these teacher math stories. First, many of the memories are linked to a specific teacher. Second, positive experiences usually involve instruction that incorporated conceptual instruction, teachers who could modify instruction to meet the needs of all learners, and teachers who were excited about teaching math. Third, negative experiences typically involved teachers who focused on math “tricks”, teachers who seemed to struggle with providing explanations, and timed math tests.

McCulloch, Marshall, DeCuir-Gunby, and Caldwell (2013) also used math autobiographies with K-2 teachers to analyze their own experiences around the people and the activities that helped to form their math identity. It was found that even though teachers were asked to recall both people and activities from their own childhood, they generally focused on the people. Positive experiences were generally attributed to teacher practice, such as high expectations, high levels of support, and effective teaching strategies, while negative experiences focused on frustration and lack of support. These findings suggest that teachers may have a strong influence on student attitudes towards mathematics and the potential to shift these beliefs. Therefore, teachers who experience negative feelings towards mathematics need to examine ways to adjust their attitude through pedagogical and content development.

Knowing that many of our teachers seem to have had similar negative experiences as our struggling learners, it is imperative that preservice and in-service teachers have the opportunity to increase their own confidence in teaching mathematics through emphasizing the appropriate teaching strategies and methods that we know positively influence student learning.

Strategies to Reset Math Attitudes

Certain common instructional techniques have been shown to negatively influence math attitudes. Inflexible teaching methods, such as insisting on one method to solve a problem, can cause anxiety in learners (Oberlin, 1982). Strict adherence to a prescribed algorithm over the examination of multiple methods to solve a problem can be a source of frustration, especially for students who may be able to find the correct answer through a different method. Focusing on quickly obtaining the one correct answer can also be a source of frustration (Shields, 2005) and emphasizes the algorithm over conceptual understanding, often through the use of math “tricks” which have no basis in mathematical reasoning (Cardone, 2015).

Understanding the cause of anxiety, stress, and lack of confidence in mathematics instruction can help us to identify techniques for improving math attitudes. In working with preservice and in-service special education teachers who work with students with MD, I emphasize three key instructional techniques that can be implemented regardless of grade level taught: teach for conceptual knowledge before procedural knowledge, teach to flexibility within declarative knowledge, and avoid using math tricks.

Teach for Conceptual Understanding Before Procedural Knowledge

The need for teaching to conceptual understanding before procedural knowledge is a key piece in improving the success of students with MD. Conceptual knowledge is about acquiring an understanding of mathematical concepts and why mathematical procedures work. Conceptual understanding also includes linking information and patterns to see how concepts work together, for example, understanding that addition and subtraction are inverse operations, or explicit understanding of how fractions and decimals are related (Miller & Hudson, 2007). Procedural knowledge is knowing how to use a set of steps to solve a mathematical problem. This is the “how” of solving mathematical tasks. Both types of knowledge are equally important in becoming
proficient mathematicians, but it is important that as special educators, focus is on ensuring conceptual understanding prior to moving on the procedural knowledge. When students possess the conceptual background, mathematical procedures are not just random steps to follow, but instead hold meaning. This understanding leads to student success, which in turn leads to improved math attitudes.

To develop conceptual understanding before procedural knowledge, one effective evidence-based practice is the concrete-representational-abstract (CRA) framework. The CRA framework begins with teaching concepts in a concrete manner. This means that students have manipulatives in hand, performing mathematical tasks without the focus on numerals and operational symbols. Once students show mastery at the concrete level, instruction moves to the representational level. In the representational level, students use drawings and pictures instead of manipulatives. It is important to be explicit in the transfer from concrete to representational by initially using both manipulatives and drawings at the same time to show the relation between the two. As mastery is shown in the representational phase, it is appropriate to then move to the abstract. Again, it is necessary to be explicit in the transfer from representational to abstract, showing both together to reinforce the relation between the conceptual to the abstract. The abstract phase focuses on solving problems without the use of manipulatives or drawings, just with numerals and operational symbols. This is where students strengthen procedural knowledge. Special education teachers need to understand how to move fluently through the CRA framework. It is not necessarily a process where one moves from concrete to representation to abstract and is then finished. As more difficult problems and concepts are introduced, it may be necessary to move back and forth through the framework, as students need help in understanding and making connections from conceptual knowledge to procedural knowledge.

**Declarative Knowledge Flexibility**

Declarative knowledge in mathematics is also a key piece to student success. Declarative knowledge involves information that needs to be recalled immediately, whether that is recognizing quickly that $5 + 7 = 12$ or that a certain figure is a triangle. This quick retrieval of information aids students in moving through more complicated math skills (Miller & Hudson, 2007). Many students with MD struggle with working memory, making declarative knowledge and the accompanying speed testing a stressful activity. When teaching and assessing declarative knowledge, it is necessary to assess using some sort of time-bound procedure such as Constant Time Delay or timed probes, as the key is that students recall information automatically.

An effective way to approach teaching basic math facts is through interactive activities. Games on tablets or computers can be one way for students to practice basic facts in a way that brings down anxiety levels. Williams (2000), studied basic fact declarative knowledge practiced through either traditional paper and pencil timed tests or a computer multiplication puzzle game. Results showed that participants using the computer game for practice significantly increased performance on a timed multiplication fact test, where those in using the paper and pencil practice did not. In another study of using computer-based practice, Kanive et al (2014) found that students in the computer-based practice group outperformed peers.

Another way effectively teach math facts, while also decreasing the stress connected to memorizing these facts, is to emphasize the patterns and relations between known and unknown facts. If we were to memorize all of the basic multiplication facts zero to twelve, there are 169 math facts. That number can be cut in half when students understand and apply the commutative property of multiplication. Then focusing on some key facts, such as multiplying by 2s, 5s, and 10s, will give students a foundation. Instructional strategies that focus on number sense are helpful in expanding past those base facts. For example, if a student immediately knows $6 \times 5 = 30$, then quickly calculating $6 \times 6 = 36$ by knowing to add on another 6, should not be as difficult.

**No Tricks**

Math tricks or sayings often have no basis in mathematical reasoning, and students have no idea why they work (Cardone, 2015). For example, many students are taught to add and subtract fractions using the "butterfly method" (see Figure 1 on page 4). While this trick may help students by quickly creating a common denominator by which to add or subtract, it often leads to irregular fractions that need to be simplified thus adding extra steps. In addition, using this method does not require students to conceptually understand how to find a common denominator. The introduction of tricks to help a student get through the lesson and solve an algorithm correctly, but the tricks quickly become meaningless without strategies that lead to understanding the true concept. When students can apply concepts, they can check to see if their answers are appropriate instead of relying on the meaningless magic of a trick.

With older students, it may be difficult to undo some of the tricks that have been taught. One resource to support
in reversing the overreliance on tricks is the website NixTheTricks.com. Cardone (2015) worked with math colleagues to collect common tricks and provide fixes that lead to conceptual understanding.

Conclusion

Research has shown that “math stories” or personal experiences in math have a profound effect on attitudes and confidence in mathematics. We know when math attitudes improve, performance improves (Ashcraft, 2002). In order to improve attitudes toward math, special educators need to focus on developing their skills in using teaching strategies that promote conceptual development. Whether this be using CRA, focusing on flexibility in declarative knowledge, or removing tricks from math instruction, it is clear that an important element in improving math instruction is teacher attitudes and skills needed to differentiate mathematics in meaningful ways that lead to conceptual understanding. Research needs to continue to examine the relationships between teaching attitudes, pedagogical skills, and student performance in mathematics. Examining these connections will likely reduce the accepted and expected math phobias and fears in both children and their teachers, and lead to increase confidence in math.

References


It was wonderful to see so many DLD members at the Council for Exceptional Children Conference and Expo in Indianapolis, Indiana last month. DLD was represented well with many members presenting in the Learning Disabilities (LD) and Response-to-Intervention (RTI) strands. In addition, we had two special sessions—the DLD Showcase, *The State of Learning Disabilities: Issues Related to Definition and Identification*, and an Invited Program-Chair Session, *Dyslexia: A Conversation about How to Align Practice with Research and Legislation*. Finally, many DLD-affiliated doctoral students presented their research and networked with faculty during our DLD reception.

Mark your calendars now for CEC 2020, which will be in Portland, OR, February 5-8, 2020. Consider submitting a proposal to the Division for Learning Disabilities’ LD or RTI strands. The proposal submission window will open March 1st and close March 31st. In the fall, submissions for the Student Poster Session and nominations for DLD awards will be solicited. Be sure to check out this year’s award recipients and learn more about DLD awards by visiting our awards page: [http://www.teachingld.org/awards](http://www.teachingld.org/awards).

Looking ahead, it is clear that the strength of our organization lies in our people, and our people have been doing great things for the division and on behalf of students with learning disabilities. To name just a few of the exciting things on the horizon for DLD, here is a snapshot of who has been doing what.

**DLD Fall Conference: DLD @ Night 2019**

*(Michael Faggella-Luby, President-Elect)*

In conjunction with the Teacher Education Division’s fall conference in New Orleans, DLD will host DLD @ Night, a mini-conference on the evening of November 7th from 5:00-8:00 p.m. The conference will feature several, in-depth learning disability-focused sessions. Registration opens April 1st. We look forward to seeing you in New Orleans!

**TeachingLD.org Update: Bill Therrien (Vice President) and Peggy Weiss (Treasurer/Web Editor)**

The beloved TeachingLD.org website is getting a makeover. Bill and Peggy have been working diligently with Common Media on the redesign and rebuild of our website. The new website will increase the responsiveness and functionality of our website making it easier for members and the community to access the information they need. The website will feature many of the tools, tips, and information that long-time visitors to TeachingLD.org rely on as well as updated content. Be on the lookout for announcements about this exciting launch!

**Standards Revision: Elizabeth Hughes (Professional Development, Standards, and Ethics Committee Chair)**

Under the direction and guidance of Elizabeth Hughes, the PDSE committee has initiated a revision of the *Learning Disabilities: Advanced Specialty Set* standards. As standards play an important role in communicating our organizational values and drive the work we do on behalf of students with learning disabilities, this undertaking is significant for the division. As we move through the process, we will be engaging members and soliciting feedback. We are confident that the end product will reflect best practice guidance for those who teach, advocate, and work for better outcomes for students with learning disabilities.

These are only a few of the things happening at DLD. To keep up-to-date with all of our people, events, and opportunities keep your browsers bookmarked to TeachingLD.org and an eye on your inbox for TeachingLD emails.

*Kristin L. Sayeski*
President, Division for Learning Disabilities

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**Join DLD in New Orleans in November for a Mini-Conference!**

*Where:* Crowne Plaza New Orleans French Quarter

*When:* November 7, 2019 @ 5-8pm

*Registration:* Opens April 1st ($50 for teachers & students; $75 for faculty). Details at [TeachingLD.org](http://www.teachingld.org)
Save the Date!
CEC’s Division for Learning Disabilities Conference is Coming!

DLD @ Night
Crowne Plaza
New Orleans French Quarter
November 7, 2019
5-8 pm

Presentation Topics Include:
• Reading Intervention
• Dyslexia
• Inclusion
• Math Instruction
• Writing Instruction
• Teacher Education

Registration opens April 1
For Updates and Registration Information, visit TeachingLD.org
I am thrilled to begin my new role as Publications and Communications (P&C) Chair of the Division for Learning Disabilities (DLD). I wanted to take this opportunity to review the role of this committee in DLD and to share our exciting plans for calendar year 2019.

A major role of the P&C involves helping to oversee and coordinate division publications. Part of this includes the publication of this bi-annual newsletter. This committee is also responsible for supporting the division’s journal: Learning Disabilities Research and Practice. Last, and perhaps most enjoyable, we play a role in selecting winners of the Kirk Award for Research and Practice, and presenting the awards annually at the conference for the Council for Exceptional Children.

And now for our exciting 2019 plans. This year, we are focused on building our committee, to include university faculty, post-doctoral, and doctoral scholars whose work involves individuals with learning disabilities and who also have an interest in the work of the committee. Also, we are working to revitalize this newsletter, which includes adding new types of content and improving its distribution and circulation. Finally, we are researching open science, to include open access, so that we can be prepared to support the journal as the field moves in this direction.

If you are interested in joining our committee or otherwise lending expertise to our work, or if you know someone who might be interested, we would love to hear from you. Please email me at kbeach4@uncc.edu.

Kristen D. Beach, Ph.D.
Assistant Professor of Special Education, UNC Charlotte

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**2018 DLD Award Winners**

We would like to congratulate this year’s DLD Award Winners! Below is a description of each award and our winners.


Doris Luft Baker is an associate professor in the Simmons School of Education and Human Development at Southern Methodist University. Her area of research is developing and testing interventions and assessments for English learners and students who are learning to read in Spanish in bilingual and monolingual settings. She and Cara Richards-Tutor published a book last year on second language acquisition, and she also published with Cara Richards-Tutor in Exceptional Children a review of experimental studies that address the needs of English learners at risk or with disabilities. Doris just received a Fulbright award to conduct research and teach in Chile.


Robin F. Schumacher, Ph.D. is a Senior Research Associate at Instructional Research Group. Her research has concentrated on mathematics interventions in upper Elementary grades for students with or at risk for specific learning disabilities. Dr. Schumacher has focused on topic areas such as rational number understanding with an emphasis on fractions, word problem solving, and algebraic reasoning. Her most recent work centers on efforts to improve the quality of students’ explanations and the use of the number line to develop mathematical insights.

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THE KIRK AWARD is named after Samuel A. Kirk, one of the United States’ foremost leaders in special education and the field of learning disabilities. This award is overseen by DLD’s Publications Committee, is given occasionally, and recognizes excellence in professional journal articles that have been published in Learning Disabilities Research.

Jeannette E. Fleischner Career Leadership Award

WINNER: Dr. Asha Jitendra, University of Minnesota

Asha K. Jitendra, is Professor and Peloy Chair in Learning Disabilities in the Graduate School of Education at the University of California, Riverside. She previously served as Rodney Wallace Professor for the Advancement of Teaching and Learning at the University of Minnesota for 10 years and on the faculty of Lehigh University for 14 years. Jitendra is the recipient of the Special Education Research SIG’s Distinguished Researcher Award from the American Educational Research Association; the Distinguished Alumni Award from the University of Oregon; the Excellence in Research award and the President’s Distinguished Faculty Mentor Recognition from the University of Minnesota. She is a Research Fellow of the International Academy for Research in Learning Disabilities. She has received several grants, totaling approximately $9 million, from federal agencies including the U.S. Department of Education’s Institute of Education Sciences (IES), the National Institute of Mental Health (NIMH), the Office of Special Education Programs (OSEP), and the U.S. Department of Health and Human Services (HHS) to support her scholarship. Her scholarly contributions include over 100 publications in high impacts outlets (e.g., Exceptional Children, Journal of Learning Disabilities, Remedial and Special Education, Elementary School Journal, Journal of Educational Psychology, Journal of School Psychology, Learning and Instruction, Journal of Research on Educational Effectiveness). She has published two research-based mathematics curricula and the IES Practice Guide, Improving Mathematical Problem Solving in Grades 4 through 8.

Jitendra has been the associate editor of the Journal of Learning Disabilities. Her research focuses on instructional design, specifically mathematics problem solving and reading interventions for students with learning disabilities; assessment; and textbook analysis. Jitendra is best known for her research on schema-based instruction (SBI) for solving word problems. Specifically, her work on SBI has evolved over the last 25 years to incorporate curriculum design theory and combine best practices in special education and contemporary mathematics education to improve mathematics outcomes for a wide range of learners (e.g., students with learning disabilities, students at risk and not at risk for learning difficulties).

The Fleischner Career Leadership Award honors those who have advanced the field of learning disabilities through direct services, policy development, community service, research or organizational leadership throughout their career.

Marva Collins Diversity Award

WINNER: Anna Elise Kay, Albuquerque, New Mexico

Anna Kay. She is a special education teacher for a second, third, fourth, and fifth grades Cross-Categorical self-contained classroom at Emerson Elementary School in Albuquerque, New Mexico. Emerson is a Title I school, as well as a community school, which provides 100% free lunch and breakfast to all students and outreach programs to students and parents in their neighborhood. Some programs include GED, ESL, technology classes for parents, weekly Homework Diners, an on-site medical clinic, monthly food pantry, and a Walking School Bus Program.

The exceptionalities of her students include Specific Learning Disabilities, Speech and Language Impairment, and Developmentally Delayed. All her students come from homes that are impacted by situational, generational, and/or absolute poverty. Approximately 66% of her students come from culturally and linguistically diverse backgrounds, including Mexican-American, African American, Navajo, and Pueblo Indian. Her primary objective each day is to create lesson plans that meet the unique IEP goals of each student and foster learning experiences that both celebrate and are sensitive to the diversity in her classroom. She has conducted a systematic literature review on mindfulness interventions for children with emotional and behavioral disorders and presented her work at CEC conference with her peers and faculty members, which is an often discussed but scarcely researched area. She has successfully translated research

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into practice and has employed these approaches with her students.

The Marva Collins Diversity Award honors a special education teacher who makes a significant impact in the education of children and youths with learning disabilities who come from culturally and linguistically diverse backgrounds.

**Outstanding Educator of the Year Award**

**WINNERS:** Dr. Kelly Grillo, Flagler County Schools & Corali de Pablos, Broward County Schools

**Dr. Kelly J. Grillo,** earned her PhD at the University of Central Florida. Her research focus is the achievement of students within Inclusive STEM Environments. Currently, Dr. Grillo is an Inclusion Biology Faculty in Technology-Rich Flagler County Schools. Dr. Grillo’s End-of-Course Exam outcomes speak to her expertise, despite disabilities, reading/language barriers, 58% of her students earned a 3 or above in the 2016-2017 and 2017-2018 school years out of 313 students being assessed. Dr. Grillo has served as a member of the AIM-AT-UDL FL State Oversight Committee, on Florida Council for Exceptional Children State board and as the education Director of Mills Aviation Charities. Dr. Grillo currently serves on the Leadership Development Committee for Internal CEC, has numerous publications, conference presentations and awards. She was honored as a nominee in Washington as a STEM Champion for Change. Dr. Grillo is a national advocate for persons with Learning Disabilities so that she herself can accept her own disability. Follow her on Twitter @kellygrillo.

**Corali de Pablos** is a 3rd grade teacher at Deerfield Beach Elementary School in Broward County, Florida. De Pablos taught special education for 6 years before moving to a general education classroom. She was a 2016 Golden Apple Teacher of Distinction in Collier County Public Schools for the best practice of “Teaching with a Big Heart”, and most recently was awarded the honor of being named the 2018-2019 Teacher of the Year for Deerfield Beach Elementary. De Pablos has a passion for making a personal connection with every child she teaches. Her belief that every child will succeed drives her dedication to her craft. She uses her wealth of experiences across grade levels, settings and service models to develop lessons that best meet the needs of the children in her classroom. She currently teaches 18 students in a Title 1 school, with a mix of English language learners (Spanish, Portuguese, Haitian-creole and Mandarin speaking) and students with disabilities in the general education setting.

**Outstanding Educator-of-the-Year Awards** are designed to recognize outstanding professionals who serve students with specific learning disabilities. Nominees may be special educators, general educators, administrators, or other educators who have spent at least 5 years serving students with learning disabilities at any grade level.

*Congratulations to our DLD Award Winners!*
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