Project DREAM: Perceptions of Algebra Strategy and Intervention Use in Rural East Texas

Brittany L. Hott
Texas A&M University-Commerce

Research
Supported by:

GREATER TEXAS
FOUNDATION

Abstract

Algebra I is a gateway course correlated with success in upper-level high school mathematics courses, college admission, entry into STEM majors, and high-earning careers. To provide the foundation necessary for students to access, persist, and complete math-oriented majors, algebra teachers must have access to high-quality, empirically validated professional development. Project DREAM (Developing Rural Educators' Algebra Methods) explores the feasibility of disseminating evidence-based practices through a comprehensive, online professional development model. Specifically, Project DREAM targets East Texas teachers working with students from diverse backgrounds (non-native English speakers, students from low socioeconomic backgrounds, students with math difficulty or disability). Results of the needs assessment completed during Year 1 suggest that East Texas algebra teachers do not have access to professional development to equip them to support diverse learners and are unfamiliar with, or do not regularly implement, evidence-based strategies. Further, East Texas algebra teachers report regular use of practices with an insufficient evidence base. Findings, a summary of Year 2 goals, and implications for practice are described.

.

Algebra I is a gateway course for success in upper-level high school mathematics courses, eventual entry into STEM majors, and high-earning careers. Although Texas continues to focus on improving mathematics achievement, college readiness, and college completion, there are widespread discrepancies in algebra performance, particularly for students who are non-native English speakers, students from low socioeconomic backgrounds, and students with disabilities. This is evidenced by performance measures. For example, Spring 2017 State of Texas Assessments of Academic Readiness (STAAR) Algebra 1 results indicate that 18% of students (n = 77,102) did not meet state standards and most likely require intensive intervention (Texas Education Agency [TEA], 2017). An additional 32% (n = 137,574) are approaching mastery of algebra content; however, significant gaps in their knowledge of essential skills are evident. Students scoring in this category may need remediation to master critical concepts (TEA, 2017). A greater percentage of students from economically disadvantaged backgrounds (n = 248,341; 23% Did Not Meet standards, 37% Approaches standards) and students who are at-risk (n = 235,210; 29% Did Not Meet standards, 33% Approaches standards) earned Did Not Meet and Approaches standards scores than the state average. Students with disabilities (n = 39,849; 58% Does Not Meet standards, 29% Approaches standards) performed significantly lower than any other group in the state, with over 87% of students not meeting standards.

Although important advances in what we know constitutes quality mathematics instruction and intervention have occurred, research-based practices are not always successfully incorporated into classroom instruction (Cook, Cook, & Landrum, 2013). Rural districts often lack access to specialists, have few discretionary resources, and are geographically isolated (Feinberg, Nujens, & Canter, 2005). There is a critical need to understand and remove the barriers that impede mathematics performance (Chen et al., 2014). In Texas, as well as across the

.

United States, it is important that greater attention be placed on successful completion of Algebra courses. Algebra I is a gateway course that supports higher-level mathematics skills (NMAP Report, 2008) and failure to provide access to a rigorous algebra course minimizes the likelihood that students will be able to pursue advanced mathematics courses, access higher education, and/or be successful in STEM careers (Gojak, 2013). Approximately 36% (n = 445) of Texas districts are classified as rural districts (TEA, 2015). These districts have an enrollment of less than 300 students or an enrollment between 300 and the median enrollment for the state, with an enrollment growth rate of less than 20% (TEA, 2015). To begin addressing the unique needs of rural Texas algebra teachers serving diverse students, an assessment of intervention and strategy use was completed. The data reported for rural East Texas districts is part of larger statewide project. The following research questions guided this study:

(1) What are rural East Texas algebra teachers' knowledge and comfort with teaching mathematics standards?

(2) What strategies do rural East Texas teachers use to teach students from diverse backgrounds (non-native English speakers, students from low socioeconomic backgrounds, and students with disabilities)?

(3) What interventions do rural East Texas teachers use to teach students from diverse backgrounds (non-native English speakers, students from low socioeconomic backgrounds, and students with disabilities)?

(4) What resources do rural East Texas teachers use to meet the needs of students with from diverse backgrounds (non-native English speakers, students from low socioeconomic backgrounds, and students with disabilities)?

(5) What are rural East Texas teachers' perceptions of barriers to implementing evidence-

.

based algebra practices to support students with mathematics difficulty or disability?

Method

Mixed methods (Creswell, 2013) were used to develop an understanding of teacher knowledge and perceptions of algebra strategies and interventions to support students with mathematics difficulty or disability. Quantitative results from a cross-sectional survey provided an overview of the research problem, and qualitative results from open-ended questions and follow-up interviews assisted with explaining the thoughts and perceptions of rural Texas algebra teachers (Creswell & Plano-Clark, 2011). Data were collected in two phases: (1) an electronic survey of teachers responsible for algebra instruction, and (2) follow-up interviews, including a sample of educators, to expand on findings from the survey and to contextualize participants' responses.

Survey Development

Meta-analyses and syntheses (see Durlack et al., 2011; Gersten et al., 2009; Rakes, Valentine, McGatha, & Ronau, 2010; Zheng, Flynn, & Swanson, 2013), research reports (e.g., NMAP, 2008, Star et al., 2015), and online resources (e.g., IRIS Center; National Council of Teachers of Mathematics, What Works Clearinghouse) were used to identify mathematics practices. Next, an expert panel was established that included the following: (1) professors of mathematics, special education, and curriculum and instruction, (2) algebra teachers, (3) special education teachers, (4) curriculum specialists, and (5) a high school principal certified in mathematics. In addition to being content specialists, each had relevant experience working with students from diverse backgrounds in rural settings. Delphi procedures were used to increase the likelihood that we captured both empirically validated and often-used strategies. Delphi procedures involve asking a confidential panel of experts to address a series of questions,

.

followed by a review process, to reach consensus (Moore, 1987, pp.15–17). The method was originally used in industry and has more recently been applied to education decision-making (see Clayton, 1997). Each expert was contacted individually by email and asked to review the list of strategies and a list of interventions, to indicate any missing strategies and interventions, or to remove strategies or interventions that did not fit. Next, a follow-up email was sent to panelists that summarized the group responses and inclusion criteria on a scale ranging from -2 (strongly disagree) to 2 (strongly agree) (Clayton, 1997). Finally, the Delphi process resulted in unanimous strategy and intervention agreement among panelists.

A cross-sectional survey comprising five sections was created, which incorporated expert panel recommendations. The first section included demographic questions followed by three sections of Likert-type items to address each of the research questions. The last section included two open-ended questions to allow participants the opportunity to provide additional information related to their practice.

Next, the expert panel reviewed the survey individually and then collectively by email. Several recommendations were suggested, including adding demographic questions (e.g., teacher's native language, number of preparations), adding open-ended questions related to professional development, and adding open-ended questions related to ineffective professional development. After the questions were modified, all members of the panel unanimously agreed that the survey aligned with research questions and was an appropriate length, and that the items were clearly defined. To further support validation, 23 graduate-level education students reviewed and completed the survey. Further adjustments were made to open-ended questions to assist with item order and clarity. The revised survey included demographic questions, 51 Likert-type items to address research questions, and three open-ended questions.

.

Quantitative items. The first section included 11 demographic questions related to teacher characteristics, teaching experience, degrees earned, certifications, school location, and classroom makeup. Items included a drop-down menu with forced choices and an "other" choice that allowed for an open-ended response.

The second section included 15 Likert-type items related to teacher perceived knowledge and comfort levels with Texas algebra curriculum domains (i.e., *Seeing Structure in Expressions*, *Arithmetic with Polynomials and Rational Functions*, *Creating Equations*, *Reasoning with Equations and Inequalities*, and *Mathematical Practices*). The first five items asked teachers to rate their content knowledge, the second five items asked them to rate their comfort with teaching content areas, and the third asked them to rate their comfort with supporting students who experienced mathematics difficulty or disability in meeting content standards. Analysis of items using Cronbach's α suggested that internal consistency for perceived knowledge (.92) and comfort (.96) were in the excellent range.

The third section included 20 questions that assessed teachers' perceived knowledge and use of strategies and interventions to address the needs of students with mathematics difficulty or disability. The items included a randomized list of practices and operationalized definitions validated using the aforementioned Delphi procedures. Item ratings were the following: *Unfamiliar with the Strategy*, *Know about the Strategy but Do Not Use the Strategy*, *Know and Implemented the Strategy this Year*, and *Routinely Use the Strategy*. Analysis of items using Cronbach's α showed internal consistency in the good range for knowledge (.89) and excellent range (.94) for strategy and intervention use.

The fourth series of the items included 16 questions focused on knowledge and use of evidence-based resources, also established using Delphi procedures. Similar to the previous

.

section, items were rated using a Likert scale from 1 to 4, with *Unfamiliar with Resource*, *Know about Resource But Do Not Use Resource*, *Know and Use Resource*, *Know and Use Resource Regularly*. Analysis of items using Cronbach's α showed internal consistency in the excellent range for knowledge (.94) and use of evidence-based resources (.92).

Qualitative items. Three open-ended questions related to use of evidence-based practices and instructional barriers were included. These questions were designed to provide participants an opportunity to share details and perspectives related to their current practice, access to resources, and barriers to implementing strategies and interventions. At the conclusion of the open-ended questions section, space was provided to include an email address for participants interested in scheduling follow-up interviews.

Survey Distribution

Following approval from the university's institutional review board, an anonymous electronic survey link was distributed though regional service centers, university faculty, district superintendents, and social media groups. Full-time, in-service teachers responsible for providing algebra instruction in rural Texas public schools were targeted. To assist with ensuring a representative sample of East Texas teachers was obtained, respondents were asked to identify their region and district from a dropdown list. Three $50 gift cards were provided to randomly selected respondents to encourage participation. The survey remained open for eight weeks, with two follow-up emails to targeted districts sent after two weeks and six weeks. Respondents included 458 teachers from 176 rural districts. Of those, 129 identified as working in East Texas districts.

Interview Protocol Development

.

Phase 2 involved conducting individual, semi-structured interviews to glean additional insight into teacher knowledge and use of evidence-based practices to meet the needs of diverse learners. Additionally, the researcher hoped to develop a greater understanding of teacher professional development needs to support diverse learners. The following questions were addressed: (1) What are the most challenging aspects of meeting the needs of diverse students? (2) How do teachers select interventions and strategies to support diverse learners? (3) What barriers are present that impact strategy selection and implementation? (4) What professional development has been helpful? and (5) What professional development opportunities have not been helpful?

Teacher Interview Procedures

After the completing the survey, participants had the opportunity to volunteer to complete a brief follow-up interview. Sixty-three respondents volunteered for follow-up interviews. The researcher selected a purposeful sample of 22 volunteers that represented the survey population in regard to teaching experience, region, and professional licenses. Of those, seven were East Texas teachers. Semi-structured phone interviews were completed by trained graduate research assistants. The interview protocol included five questions related to instructional strategy use, access to resources, barriers to implementing evidence-based strategies, and professional development practices and needs. Interviews ranged from 29 to 46 minutes. After each interview was completed, a graduate research assistant transcribed the interview. First-level member checks were used to assist with credibility (Bratlinger et al., 2005). After transcriptions were completed, interviewees were emailed a copy of their responses to check for agreement with the transcription.

.

Data Analysis

After reading the transcriptions in their entirety, a graduate research assistant and the first author independently completed open coding of a series of interviews. Next, 5 primary categories and 12 subcategories were identified, agreed upon, and defined. To assist with maintaining consistency and trustworthiness of the analysis, a third coder served as a peer de-briefer (Bratlinger et al., 2005).

Phase 1 Results

Most East Texas respondents reported working in high schools (91%), followed by middle schools (8%) and elementary schools (<1%). Over 79% of respondents reported 1 to 3 years of teaching experience. with the second-highest years of experience group ranging from 7 to 15 years of experience (13%). The remaining respondents reported 4 to 6 years of experience (3%) and 16 or more years of experience (5%). Most respondents were Caucasian, native English speakers (94%). Approximately 82% of respondents identified as female, with about 33% of those respondents having earned a Master's or Educational Specialist degree. Participants reported a variety of certifications, with the most common including elementary mathematics, middle grades mathematics, or secondary mathematics. Approximately 6% of respondents reported having special education, counseling, and/or administration and supervision endorsements. Most respondents reported teaching 9th, 10th, and 11th grade algebra courses (88%). Less than 5% of respondents reported teaching algebra courses in grades six to eight. Respondents were responsible for teaching one to eight sections of algebra with the majority teaching two to three sections. Preparations ranged from one to seven, with a majority of respondents reporting three or more preparations (74%). Course responsibilities varied and

.

included teaching engineering, pre-calculus, geometry, physics, and statistics courses, in addition to algebra.

Participants indicated that their classrooms included English-language learners, students with disabilities, students who receive free and reduced lunch, and students from minority backgrounds. A majority of respondents indicated that their classrooms include over 50% of students who are eligible for free and reduced lunch. Additionally, the majority of participants reported that 51% to 75% of their classes experience difficulty passing classroom assessments, district benchmarks, and/or state tests. As the grade level increased, the percentage of students experiencing difficulty also increased, as did the percentage of students from minority backgrounds, English-language learners, students eligible for free and reduced lunch, and students with disabilities. For example, most teachers who worked with 11th grade students reported that most of their students struggled to complete grade level assessments (91%) and that many of their students were included in one of the previously mentioned groups (87%).

Summary of Phase 1 Findings

Results suggest that rural East Texas teachers are comfortable with the mathematics domains associated with the algebra curriculum; however, results indicate that teachers are uncomfortable teaching students who experience mathematics difficulty or have disability. Further, teachers' knowledge and perceptions of evidence-based practices appear limited.

Content knowledge and comfort. Responses suggest that teachers perceive their content knowledge of the Texas Algebra standards, including *Seeing Structure in Expressions*, *Arithmetic with Polynomials and Rational Functions*, *Creating Equations*, *Reasoning with Equations and Inequalities*, and *Mathematical Practices* as exceptional, as evidenced by over 98% of teachers rating their skills as exceptional mastery of related concepts. Less than 2% of

.

teachers rated their content knowledge for any of the domains as knowledgeable, but could learn more. None of the respondents indicated that they needed additional content training in any of the content areas.

Although participants indicated that they are knowledgeable regarding content, results indicate that participants are uncomfortable teaching some of the algebra content. For example, over 70% of respondents indicated that *Mathematical Practices* and *Arithmetic with Polynomials and Rational Functions* are difficult or extremely difficult to teach, with less than 8% indicating extremely comfortable teaching any of the five content areas. Over 70% of respondents indicated that each of the five areas was difficult to extremely difficult to teach students from diverse backgrounds in all five domains. Less than 4% of respondents indicated comfort in teaching *Mathematical Practices* to students from diverse backgrounds.

Knowledge and use of strategies. The most frequently reported strategies and interventions included learning styles, lecture, providing a range of examples to illustrate key concepts, and use of different algebraic representations. Approximately 26% of respondents indicated that they implemented learning styles at some point during the year, and an additional 55% of respondents indicated routine use of learning styles. Teacher-delivered lectures were used routinely by approximately 70% of respondents and implemented at some point during the year by an additional 21% of respondents. Respondents indicated routinely using a variety of examples to illustrate key concepts (42%). Approximately 88% of teachers reported incorporating solved problems into classroom instruction and activities at some point during the year or routine use of the strategy. Respondents also reported teaching students that different algebraic representations can covey different information about a problem, with over 90%

.

reporting using the strategy in their classrooms. Problem-based learning (PBL) was another familiar strategy, yet only 36% of respondents reported routine use of PBL strategies.

Although teachers indicated a variety of practices that they use in their classrooms, they also shared that they are familiar with several strategies but did not implement those strategies in their classrooms. For example, 14% of teachers reported being familiar with learning styles but not using the strategy; 8% were familiar with mindsets, but elected not to use the strategy. Table 1 provides a summary of reported strategy use.

Knowledge and use of interventions. The most routinely used interventions to support students from diverse backgrounds included explicit instruction, providing a range of examples, teacher feedback, and visual representations. Conversely, fewer teachers reported use of empirically validated interventions, including Concrete-Representation-Abstract (CRA) sequence, instructional sequencing, schema-based instruction, or student feedback with goal setting. Approximately 77% of respondents indicated that they were unfamiliar with schema-based instruction or were familiar with, but do not use, schema-based instruction. Over 60% of respondents were unfamiliar with or do not use the CRA sequence. See Table 2 for a summary of teacher knowledge and use of interventions.

Knowledge and use of resources. The majority of respondents indicated knowledge of, and routine use of, popular social media and outlets including Facebook (26%), Pinterest (37%), and blogs (26%). Reliance on conversations with other teachers (74%) and Teachers-Pay-Teachers (27%); as well as conversations with district specialists (21%), were other popular resources that were routinely used. Over 40% of teachers indicated familiarity with several mathematics education practitioner journals, but noted that they do not use them as a resource. Additionally, some teachers reported knowledge of professional organizations (26% to 44%), but

.

also indicated that they do not use this resource. Respondents were generally unfamiliar with evidenced-based resources. See Figure 1.

Professional development activities. The majority of participants answered at least one of the open-ended questions related to use of evidence-based practices. The most common response to professional development activities attended within the last year included variations of *not able to attend professional development* or *no professional development was provided*. The majority of teachers who listed professional development activities indicated that the activities focused on "using required technology" or "dealing with technology in the classroom." One teacher indicated attending a workshop on robotics. The most common response to areas of need included activities to help students learn study skills, note taking, accountability, and goal setting. Barriers to implementing research-based strategies included time, funding, "district buy in," principal support, access to quality substitute teachers, and funding to enable attendance at professional development activities.

Phase 2 Results

The interview participants painted a similar picture of their current practices, professional development offerings, definition of high-quality professional development, and current barriers to evidence-based practices. Most of the teachers reported using instructional strategies taught in undergraduate coursework or learned informally through other teachers; these strategies were a mix of both evidence-based and strategies that lack empirical support. Although teachers reported limited access to sustained professional development beyond expensive and logistically unfeasible university coursework, participants agreed on what constituted high-quality professional development. However, participants also reported similar perceived obstacles to

.

implementing such professional development in their districts/school. General themes and representative quotes are summarized below.

There were two main sources of credible strategies for interview participants. When considering knowledge and comfort with implementing evidence-based practices, teachers reported that they primarily used the strategies they were taught during their undergraduate coursework or learned from other teachers. A high school algebra teacher shared the following:

> I learned about PBL [problem-based learning] during a course at Stephen F. Austin. We designed labs and students completed activities. I like PBL and believe it helps my students. If all teachers had the opportunity to use PBL, STAAR scores [state test] would go up.

Another participant reported:

> My neighbor down the road teaches. We talk a lot about how to best teach our students. We use games. We try to create problems that are interesting and relevant. We share materials. We share ideas.

Approximately 85% (6/7) of the participants shared that they learned many of the strategies they use during undergraduate course work. The respondents varied in age, experience, and degrees obtained.

The strategies that participants shared as credible and effective included both evidence-based and non-evidence-based practices, which were given equal credence. The evidence-based strategies shared included providing real-world examples and active questioning techniques. Approximately 57% (4/7) of participants mentioned at least one empirically validated strategy included in the recent meta-analyses or research reports reviewed for the study.

.

However, several strategies that lack empirical support were also shared including learning styles and mindsets. A 10th grade teacher reported:

> You have to understand how kids learn. I have students that learn through visuals and others who are auditory learners. You have to figure out how a kid learns and then teach to his style.

Participants were aware of the need for ongoing, high-quality, formal professional development beyond their informal shared network of teacher strategies. Each of the participants (100%, 7/7), however, felt that their current professional development could benefit from improvements in format and content. Additionally, participants (85%, 6/7) shared that what professional development is available is often "one-shot" days and does not include the necessary follow through to ensure effective implementation or sustainability. A respondent shared, "We are forced to attend district trainings. Often the presenters do not understand our students and there is no additional training beyond the one day." Another participant reported the following:

> I attend the before-school required meetings. Beyond that, nothing. Nothing in over five years. I would like to be able to attend conferences, but they are too expensive and there is no money.

Limited access to high-quality professional development was the primary obstacle to implementing new evidence-based practices in participants' classrooms. Participants also reported limited or no access to professional development beyond taking college courses that are expensive and too far away (e.g., teachers cannot leave their school and get to campus by 4:30 p.m.). Additionally, 75% (6/8) participants mentioned class size as a barrier to meeting the needs

.

of students experiencing mathematics difficulty or with a disability. A teacher from deep East Texas shared the following:

> In rural Texas, there is always enough room to add a portable. In rural schools, you have men that just go out and build them. We then have to figure out how to teach in these portables without resources or space. You can't turn away kids. We have to take them all regardless of space to put them. Ninth graders are big and need their space.

Summary and Discussion of Findings

The process of ensuring that research-based practices are implemented is multifaceted and complex. First, high-quality, relevant research must be conducted (Cook & Odem, 2013). Second, dissemination approaches must be purposeful and relevant to practitioner needs (Cook, Cook, & Landrum, 2013). Third, there must be an understanding that educators have varying levels of access and knowledge of quality instructional practices. Some are in the beginning stages of understanding and need exposure to evidence-based practices. Others understand the need for empirically validated practices but need assistance with determining which practices are appropriate, while others need assistance with fidelity of implementation. Factors such as access to professional development, time, and resources also impact teachers' ability to implement quality interventions (Klingner, Boardman, & McMaster, 2013). These issues are compounded in rural school settings, where professionals with significant expertise have limitations such as multiple duties and limited time to support initiatives (Steed, Jakubiec, & Kooyman, 2013).

Findings suggest that there are several areas that would be helpful in supporting rural East Texas teachers with implementing evidence-based practices to meet the needs of students experiencing mathematics difficulty or with a disability. These areas include assistance with identifying evidence-based practices and easy ways to implement practices within the context of

.

East Texas schools. Although participants reported that they are comfortable to extremely comfortable with algebra content, they indicated that they needed support to meet the needs of students with diverse learning needs, particularly in the areas of *Mathematical Practices* and *Arithmetic with Polynomials and Rational Functions*. Furthermore, training to support implementation of effective strategies and interventions is warranted. Although it is promising that participants identified explicit instruction and modeling as routinely used strategies, it is concerning that participants are unfamiliar with, and report that they do not use, empirically validated interventions such as the CRA sequence (see Strickland & Maccini, 2010) or schema-based instruction (see Jitendra et al., 2017). Also concerning is that two of the most commonly reported strategies were learning styles and mindsets, both of which lack a clear evidence base for effectiveness (see Landrum & McDuffie, 2014). Participants shared that learning styles are occasionally taught in the region's institutions as part of the undergraduate courses, or presented as part of professional development, which may account for some of the weight given to this particular strategy.

Teachers reported using internet sites such as Facebook, Pinterest, and Teachers-Pay-Teachers to locate teaching resources, but not using websites that offer evidence-based teaching strategies and interventions, such as RtI Network, Intervention Central, and PBIS.org. Many teachers appeared unfamiliar with these websites. Allowing opportunities for teachers to explore the sites and dialog about strategy use and implementation would be beneficial. Teachers also stated that although they are familiar with practitioner journals and professional organization websites, they do not use them. Information from these sources could be disseminated through blogs or interactive environments, which are cost-effective and have the potential to lead to instructional changes.

.

Several concerns related to professional development were reported, including not being able to attend because of scheduling conflicts or lack of qualified substitute teachers, professional development focused on technology integration instead of on evidence-based teaching practices, and professional development not being offered at all. Providing no-cost or low-cost resources that do not require enrollment in a university course may be a viable option to support teachers. These resources would be available in a format accessible to teachers at any time and from any location, such as a website or document sharing site. Including opportunities for follow up and discussion may also prove beneficial as teachers reported "one shot" professional development was not sufficient. Finally, teachers reported difficulties in teaching algebra concepts not only to students with disabilities, but also to students learning English and students from low socioeconomic backgrounds. Professional development should include strategies and interventions shown to be effective for each of these populations, such as feedback with goal setting and instructional sequencing.

As researchers continue to focus on developing effective interventions to support practitioners, it is also important to assess both the social validity of interventions and to ensure that dissemination efforts are effective. There are many areas of future work that have the potential to improve outcomes for students with mathematics difficulty or disability. Implementation and evaluation of professional development to support secondary mathematics instruction, particularly in Algebra 1, seems critical. These offerings need to take into account the unique needs of rural educators. Assessments should include both teacher and student data to track effectiveness. Additional studies may examine follow-up professional activities using technology such as Twitter chats, blogs, and social media.

.

Conclusion

Algebra I is a gateway course that is correlated with advanced mathematics study, college admission, and STEM degree obtainment (Chen et al., 2014; Hott & Carlson, in press). Therefore, teachers need to implement quality strategies and interventions to meet the needs of students who experience mathematics difficulties or have disabilities. Findings from this study suggest that East Texas algebra teachers do not have access to, or have not implemented, empirically validated interventions such as CRA and schema-based strategies that could be beneficial in meeting the needs of students experiencing mathematics difficulty or with a disability. Furthermore, East Texas algebra teachers need additional, targeted professional development and relevant follow-up activities to meet the needs of students from diverse backgrounds.

.

References

Brantlinger, E., Jimenez, R., Klingner, J., Pugach, M., & Richardson, V. (2005). Qualitative studies in special education. *Exceptional Children*, *71*(2), 195–207.

Chen, S., Hall, T. R., Jackson, C. A., Liu, X., Morin, Z., & Sargent, O. T., & Steere, V. S. (2014). *Postsecondary Completion in Rural Texas: A Statewide Overview.* Bush School of Government and Public Service: College Station, TX.

Clayton, M. J., (1997). Delphi: A technique to harness expert opinion for critical decision-making tasks in education. *Educational Psychology, 17*, 373–386.

Cook, B. G., Cook, L., & Landrum, T. J. (2013). Moving research into practice: Can we make dissemination stick? *Exceptional Children, 79*, 163–180.

Cook, B. G., & Odem, S. L. (2013). Evidenced-based practices and implementation science in special education. *Exceptional Children, 79*, 135–144.

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA: Sage.

Creswell, J. W., & Plano-Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: Sage.

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development, 82*, 405–432.

Feinberg, T., Nuijens, K., & Canter, A. (2005). Workload vs. caseload: There's more to school psychology than numbers. *NASP Communique, 33*.

.

Gersten, R., Chard, D. J., Jayanthi, M., Baker, S. K., Morphy, P., & Flojo, J. (2009). Mathematics instruction for students with learning disabilities: A meta-analysis of instructional components. *Review of Educational Research*,*79*(3), 1202–1242.

Gojak, L. (2013). Algebra: Not "If" but "When", National Council of Teachers of Mathematics: Reston, VA. Retrieved from: http://www.nctm.org/News-and-Calendar/Messages-from-the-President/Archive/Linda-M_-Gojak/Algebra_-Not-_If_-but-_When_/

Hott, B. L., Carlson, M. A. (in press). The influence of student and school characteristics on the college entry and STEM degree obtainment. White paper. Texas OnCourse Research Network, Austin, TX.

Jitendra, A. K., Lein, A. E., Im, S. H., Alghamdi, A. A., Hefte, S. B., & Mouanoutoua, J. (2017). Mathematical interventions for secondary students with learning disabilities and mathematics difficulties: A meta-analysis. *Exceptional Children*, 64, 21–43. doi: 0014402917737467.

Klingner, J. K., Boardman, A. G., & McMaster, K. L. (2013). What does it take to scale-up and sustain evidence-based practices? *Exceptional Children, 79*, 195–211.

Landrum, T. L., & Landrum, M. K. (2014). DLD Current Practice Alerts: Learning styles. Retrieved from: http://s3.amazonaws.com/cmi-teaching-ld/alerts/24/uploaded_files/original_DLD_Alert21_LearningStyles.pdf?1404680392

Moore, C. M. (1987). *Group techniques for idea building.* California: Sage.

National Mathematics Advisory Panel. (2008). *Foundations for Success: The Final Report of the National Mathematics Advisory Panel*, U.S. Department of Education: Washington, DC.

.

Rakes, C. R., Valentine, J. C., McGatha, M. B., & Ronau, R. N. (2010). Methods of instructional improvement in algebra: A systematic review and meta-analysis. *Review of Educational Research*, *80*(3), 372–400.

Star, J. R., Caronongan, P., Foegen, A., Furgeson, J., Keating, B., Larson, M. R., Lyskawa, J., McCallum, W. G., Porath, J., & Zbiek, R. M. (2015). Teaching strategies for improving algebra knowledge in middle and high school students (NCEE 2014-4333). Washington, DC: National Center for Education Evaluation and Regional Assistance (NCEE), Institute of Education Sciences, U.S. Department of Education. Retrieved from the NCEE website: http://whatworks.ed.gov.

Steed, E., Pomerleau, T., & Muscott, H. (2013). Program-wide positive behavioral interventions and supports in rural schools. *Rural Special Education Quarterly, 32*, 78–85.

Strickland, T. K., & Maccini, P. (2010). Strategies for teaching algebra to students with learning disabilities: Making research to practice connections. *Intervention in School and Clinic*, *46*(1), 38–45.

Texas Education Agency. (2017). *State of Texas Assessments of Academic Readiness: Summary Report Algebra 1.* Retrieved from: file:///Users/brittanyhott/Downloads/staar-eoc-sum2015-Spring-Alg-f%20(1).pdf

Texas Education Agency (2015). *District Type Glossary of Terms*. Retrieved from: https://tea.texas.gov/acctres/analyze/1213/gloss1213.html

Zheng, X., Flynn, L. J., & Swanson, H. L. (2013). Experimental intervention studies on word problem solving and math disabilities: A selective analysis of the literature. *Learning Disability Quarterly, 36*, 97-111.

.

Table 1

Reported Use of Instructional Strategies

Strategy	Unfamiliar with the Strategy	Know About the Strategy But Do Not Use the Strategy	Implemented the Strategy at Some Point During the Year	Routinely Use the Strategy
Embodied Cognitive Processing	43% (*n* = 116)	4% (*n* = 13)	41% (*n* = 108)	8% (*n* = 21)
Incorporating Solved Problems into Classroom Instruction and Activities	0% (*n* = 0)	12% (*n* = 15)	41% (*n* = 53)	47% (*n* = 61)
Lecture	3% (*n* = 4)	4% (*n* = 5)	18% (*n* = 23)	75% (*n* = 97)
Learning Styles	5% (*n* = 6)	14% (*n* = 18)	26% (*n* = 34)	55% (*n* = 71)
Mindsets	2% (*n* = 3)	8% (*n* = 10)	36% (*n* = 46)	54% (*n* = 70)
Problem Based Learning	5% (*n* = 6)	24% (*n* = 31)	35% (*n* = 45)	36% (*n* = 47)
Reflective Questioning	10% (*n* = 13)	6% (*n* = 8)	63% (*n* = 81)	21% (*n* = 27)
Teach Algebraic Representations Can Convey Different Meanings	1% (*n* = 1)	5% (*n* = 6)	51% (*n* = 66)	43% (*n* = 56)

.

Table 2

Reported Use of Interventions to Support Learners with Mathematics Difficulty or Disability

Intervention	Unfamiliar with the Intervention	Know About the Intervention But Do Not Use the Intervention	Implemented the Intervention at Some Point During the Year	Routinely Use the Intervention
Concrete-Representation-Abstract Sequence	62% (*n* = 80)	14% (*n* = 18)	13% (*n* = 17)	11% (*n* = 14)
Explicit Instruction	0% (*n* = 0)	6% (*n* = 8)	40% (*n* = 51)	54% (*n* = 70)
Heuristics	40% (*n* = 52)	15% (*n* = 19)	22% (*n* = 28)	23% (*n* = 30)
Instructional Sequencing	26% (*n* = 34)	11% (*n* = 14)	38% (*n* = 49)	25% (*n* = 32)
Peer Tutoring	9% (*n* = 12)	5% (*n* = 6)	53% (*n* = 68)	33% (*n* = 43)
Schema-based Instruction	77% (*n* = 99)	4% (*n* = 5)	14% (*n* = 19)	5% (*n* = 6)
Sequencing/Range of Examples	0% (*n* = 0)	8% (*n* = 10)	32% (*n* = 41)	60% (*n* = 78)
Student Feedback	1% (*n* = 1)	5% (*n* = 6)	63% (*n* = 81)	31% (*n* = 41)
Student Feedback with Goal Setting	4% (*n* = 5)	28% (*n* = 36)	36% (*n* = 46)	32% (*n* = 42)
Student Verbalizations/Think Alouds	5% (*n* = 6)	22% (*n* = 28)	47% (*n* = 61)	26% (*n* = 34)
Teacher Feedback	0% (n = 0)	14% (*n* = 18)	33% (*n* = 43)	53% (*n* = 68)
Visual Representations	0% (n = 0)	5% (*n* = 6)	46% (*n* = 61)	47% (*n* = 62)

.

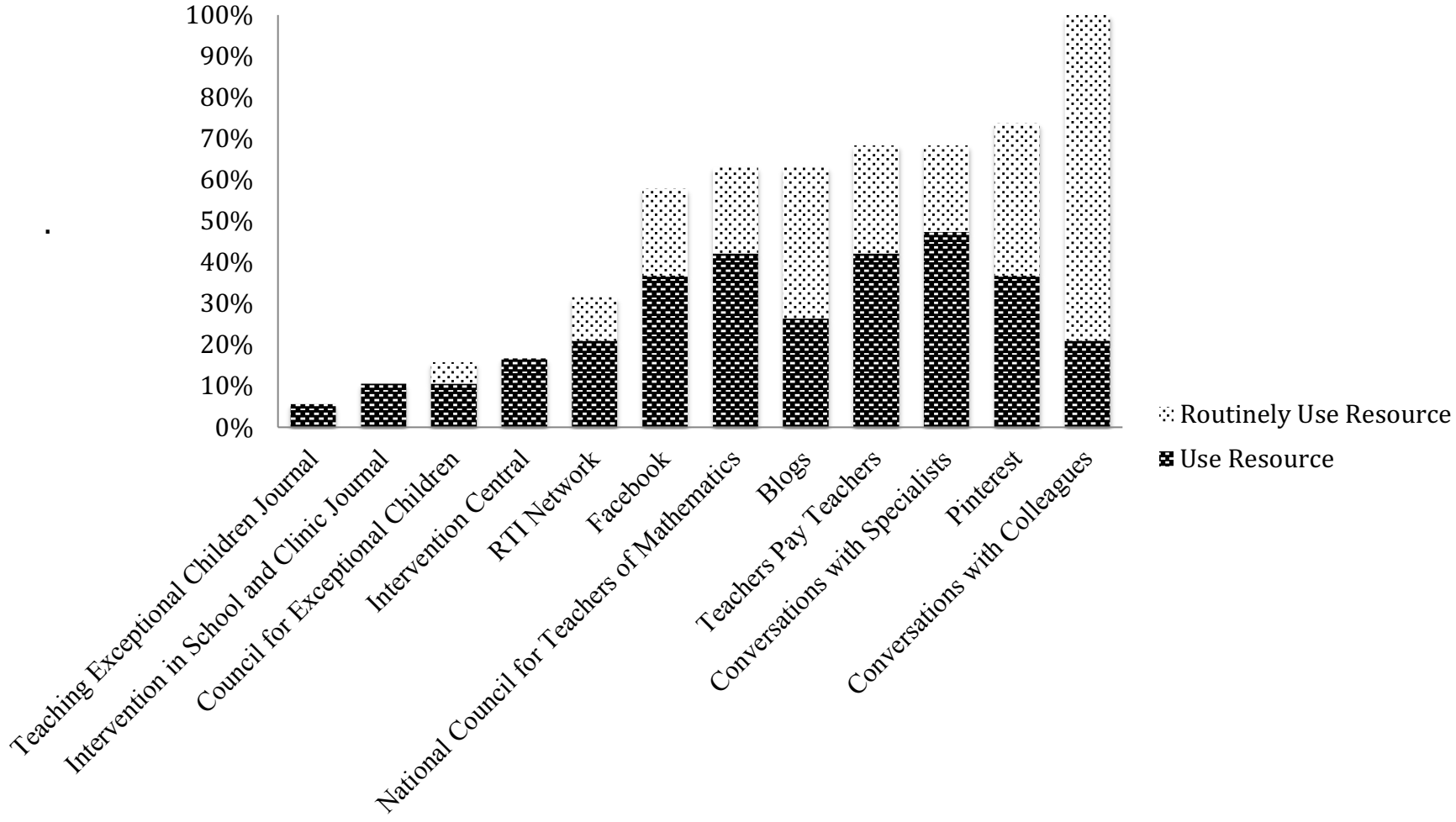

Figure 1. Teacher Knowledge and Use of Resources