The Effectiveness of Math Recovery

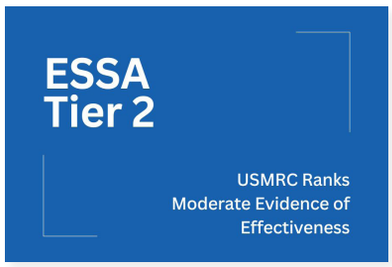
Melissa A. Gallagher

October 2024

Table of Contents

www.mathrecovery.org

Introduction



The US Math Recovery Council provides a comprehensive set of resources that support mathematics teaching and learning, offering targeted resources and professional development for teachers, schools, and districts. Established as an evidence-based method for improving student outcomes, the US Math Recovery Council products (e.g., books, curriculum materials, and professional development) are designed to address numeracy challenges and foster long-term mathematics achievement for all students. **The Math Recovery Specialist training, a cornerstone product of the US Math Recovery Council, is designated a Tier 2 intervention by the What Works Clearinghouse.** The purpose of this white paper is to highlight key research findings related to the impact of US Math Recovery products and to share how these align with the Every Student Succeeds Act (ESSA) Tier 2.

ESSA requires state and local education agencies to use "evidence-based strategies to improve student achievement" (Every Student Succeeds Act, 2015) a mandate which has caused many districts and schools to reassess the strategies they have been using in classrooms. There is an important distinction between "research-based" and "evidence-based" strategies. As defined by the U.S. Department of Education, research-based strategies are grounded in educational research on how students learn. These strategies are developed based on theories or studies about learning, but they do not necessarily have direct evidence showing they improve student outcomes. Evidence-based strategies, in contrast, often begin as research-based but are then subject to experimental or quasi-experimental studies to demonstrate their impact on student achievement.

As educators seek programs that are not only research-based but also proven to improve student achievement, understanding how the US Math Recovery Council products align with federal standards can help school and district leaders make more effective decisions about strategies to adopt.

The Research Base

The products offered by the US Math Recovery Council are based on decades of mathematics education research (Phillips et al., 2003; Wright, 2000, 2003; Wright et al., 2006). The initial Math Recovery training was developed through a three-year project at Southern Cross University in New South Wales (1992-1995), which drew from Wright's doctoral research on numerical development (Wright, 1989, 1991, 1994). This first project was funded by the Australian Research Council with contributions from local school systems and involved 20 teachers and over 200 students in developing interview schedules, teaching principles, a learning trajectory (i.e., the Learning Framework in Number, LFIN), and instructional settings (Wright et al., 2006).

The LFIN, which is at the core of all the US Math Recovery Council products, provides a comprehensive description of children's early number or arithmetical knowledge, considering all aspects as interconnected rather than distinct. It covers eleven essential areas, including the Stages of Early Arithmetical Learning adapted from research by Steffe and colleagues (Steffe et al., 1983; Steffe et al., 1988) and research on number sequences, combining and partitioning numbers, spatial patterns, and other foundational mathematical concepts (Cobb & Wheatley, 1988; Wright, 1991, 1994). The US Math Recovery Council approach integrates research on intensive, problem-based instruction methods with a Piagetian and constructivist framework (von Glasersfeld, 1995). The many products offered by the US Math Recovery Council are built upon this robust research-base.

The Evidence Base

In 2020, the What Works Clearinghouse (WWC) reviewed the evidence on the Math Recovery Specialist training and assigned a rating of Tier 2 Moderate Evidence of Effectiveness (U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, What Works Clearinghouse). The WWC review is considered the gold standard for educational programs, as it evaluates programs using strict criteria for quality and evidence. The Tier 2 designation awarded to the US Math Recovery Council signifies that this training has demonstrated statistically significant effects in a well-controlled study. Few math programs have received such a high designation from the WWC.

The study that the WWC reviewed was conducted by Smith and colleagues (2013), which is one of the largest and most comprehensive evaluations of US Math Recovery Council professional development to date, involving 775 students across 20 elementary schools in rural, urban, and suburban settings. This two-year randomized control trial found that first grade students receiving interventions provided by Math Recovery Specialists significantly outperformed those in the control group. These findings suggest that the Math Recovery Specialist training yielded significant improvements to students' mathematical learning.

US Math Recovery intervention principles have also been modified to incorporate principles to support children with severe intellectual disabilities and autism (Tzanakaki et al., 2014). In this study, 24 elementary students were randomly

assigned to either an intervention group, which received individualized numeracy teaching based on the adapted curriculum, or a control group with regular math instruction for 12 weeks. Pre- and post-intervention tests showed that the intervention group made moderate to large improvements in math achievement, which were maintained seven months after the intervention. These findings highlight the versatility of the Math Recovery principles to support the needs of diverse students.

In addition to the Math Recovery Specialist training targeting interventionists, the US Math Recovery Council also provides training for classroom teachers, called Add+VantageMR (AVMR), which applies the same principles to whole class instruction. In an evaluation of AVMR training held in Michigan, Rulf and colleagues (2017) found a positive impact on student achievement. In fact, the AVMR-trained teachers' students' growth from fall to spring was statistically significant and most exceeded the projected growth on the NWEA MAP test. Additionally, the authors found statistically significant change from fall to spring in the percent of both first and fifth grade students who scored at or above the national norm. Although the authors did not use an experimental design, comparing student growth to national norms provides evidence that AVMR-trained teachers may have impacted student growth beyond what would have been expected. Compared to other programs with similar goals, US Math Recovery professional development opportunities stand out due to their focus on supporting teachers' understanding of how students learn mathematics and how to plan instruction to meet their students' needs.

There is considerable research on the use of US Math Recovery Council products in different settings. Several studies (Rulf et al., 2017; Smith et al., 2013; Tzanakaki et al., 2014) have used rigorous designs to examine the impact of different US Math Recovery Council products and have found significant impact on student achievement.

Conclusions

In summary, US Math Recovery Council's strong foundation in research and demonstrated evidence-based effectiveness makes their suite of products standout resources for supporting student achievement in mathematics. The program's ability to meet ESSA Tier 2 standards positions it as an invaluable resource for schools and districts looking to implement proven strategies for math success. Educators and district leaders can use the evidence presented here to confidently adopt US Math Recovery products, knowing that it provides both a research-based framework and proven strategies to support students with diverse needs. There are not many math programs that have received the Tier 2 designation from the WWC, indicating that they are evidence-based. The US Math Recovery Council products, which are based on decades of mathematics education research, have demonstrated evidence of effectiveness in impacting student learning growth and earned this designation.

References

Cobb, P., & Wheatley, G. (1988). Children's initial understandings of ten. *Focus on Learning Problems in Mathematics*, *10*(3), 1-26.

Every Student Succeeds Act, 20 U.S.C. § 6301 (2015). https://www.congress.gov/bill/114th-congress/senate-bill/1177

Phillips, V., Leonard, W., Horton, R., Wright, R., & Stafford, A. (2003). Can Math Recovery® save children before they fail? *Teaching Children Mathematics*, *10*(2), 107-111.

Rulf, R., Everett, K., Miller, P. (2017). *Analysis of normative data from NWEA Mathematics Measure of Academic Progress (MAP), grades K-5, 2015-16.* Science and Mathematics Program Improvement (SAMPI), Mallinson Institute for Science Education, Western Michigan University.

Smith, T. M., Cobb, P., Farran, D. C., Cordray, D. S., & Munter, C. (2013). Evaluating Math Recovery: Assessing the causal impact of a diagnostic tutoring program on student achievement. *American Educational Research Journal*, *50*(2), 397-428.

Steffe, L. P. (1992). Schemes of action and operation involving composite units. *Learning and Individual Differences*, *4*(3), 50.

Steffe, L. P., Cobb, P., von Glasersfeld, E., & Sinclair, H. (1988). *Construction of arithmetical meanings and strategies.* Springer-Verlag.

Steffe, L., von Glasersfeld, E., Richards, J., & Cobb, P. (1983). *Children's counting types: Philosophy, theory and application.* Praeger Publishers.

Tzanakaki, P., Hastings, R. P., Grindle, C. F., Hughes, J. C., & Hoare, Z. (2014). An individualized numeracy curriculum for children with intellectual disabilities: A single blind pilot randomized controlled trial. *Journal of Developmental and Physical Disabilities*, *26*, 615-632. https://doi.org/10.1007/s10882-014-9387-z

U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, What Works Clearinghouse. (2020). *Study review: Evaluating Math Recovery: Assessing the causal impact of a diagnostic tutoring program on student achievement [Intensive one-to-one tutoring in arithmetical knowledge vs. control].* https://ies.ed.gov/ncee/WWC/Study/87296

von Glasersfeld, E. (1995). *Radical constructivism.* Routledge. https://doi.org/10.4324/9780203454220

Wright, R. (1989). *Numerical development in the kindergarten year: A teaching experiment.* Doctoral Dissertation. University of Georgia.

Wright, R. (1991). What number knowledge is possessed by children entering the kindergarten year of school? *Mathematics Education Research Journal*, *3*(1), 1-16.

Wright, R. (1994). A Study of the numerical development of 5-year-olds and 6-year-olds. *Educational Studies in Mathematics*, *26*(1), 25-44.

Wright, R. (2000). Professional development in recovery education. In L. Steffe & P. W. Thompson (Eds.), *Radical constructivism in action: Building on the pioneering work of Ernst von Glasersfeld* (pp. 134-151). Falmer.

Wright, R. (2003). Math Recovery®: A program of intervention in early number. *Australian Journal of Learning Disabilities*, *8*(4), 6-11.

Wright, R. J., Stanger, G., Stafford, A. K., & Martland, J. (2006). *Teaching number: Advancing children's skills and strategies.* SAGE Publications.

