Chapter 20
Transforming K–12 Mathematics Classroom Teacher Pedagogy Through Virtual Number Talks

Candace Joswick
The University of Texas at Arlington, USA

Nicole Fletcher
Fairfield University, USA

Audrey Meador
iD https://orcid.org/0000-0002-2510-8478
West Texas A&M, USA

ABSTRACT

Number Talks is a popular K-12 mathematics routine utilized in classrooms across the United States. Number Talks allows teachers to elicit and respond to students' mathematical thinking through the development of an encouraging classroom community and provide opportunities for students to engage in critical thinking, collaboration, communication, and creativity. In this chapter, the authors report their "virtualization" of the Number Talks routine and the development of a teacher learning cycle that supports implementation of this practice. The virtualization of Number Talks is illustrated through the pedagogical transformation of one teacher, who begins the teacher learning cycle skeptical of the value of Number Talks and ends with an innovative Virtual Number Talks practice that benefited both students and teachers in her school. This teacher's implementation of Virtual Number Talks and engagement in the "4C" of 21ˢᵗ century learning demonstrate a transformation of pedagogy that uses technology to create rich online mathematics learning experiences.

INTRODUCTION

Few, if any, common face-to-face classroom mathematics routines are considered widely for virtual implementation. Further, little, if any, initial teacher preparation or continuing education and professional development courses account for virtual teaching and learning of K-12 mathematics. Yet both—considerations for implementing common classroom mathematics routines online and teacher preparation for virtual environments–have become especially important due to the ongoing global pandemic and the rapid shift to and continued prominence of online teaching and learning. Transitioning classroom routines from face-to-face settings to virtual spaces can allow for continuity of instruction and assurance that instruction continues to focus on content. Further, when comparing online learning to face-to-face, there become novel approaches to instruction and learning not previously available. Perhaps in the most basic sense, technology can be used to replicate physical tools or face-to-face instructional activities with digital tools or environments with "no functional change" (Puentedura, 2013). That is, the technology provides a nearly direct *substitution* for the face-to-face routine (Puentedura, 2013) that is *replicated* nearly unchanged (Wang & Torrisi-Steele, 2015). At the other end of the spectrum, technology may be used to *redefine* in-person instruction (Puentedura, 2013), such that the virtual routine is a *transformation* of the face-to-face routine (Baran et al., 2011). One such redefinition is to use the technology in instructional activities in ways previously not envisioned with physical tools, thus a *transformation* of instructional activities through technology (Barlow et al., 2020). Regardless of the particular technology (e.g., applications) chosen to move instructional routines online, infusion of technology in classroom practice increases the demand on teacher knowledge and expertise.

In this chapter, the authors argue that starting with a common classroom routine and supporting teachers' learning specifically of this activity for virtual implementation provides technology-specific learning and skill development opportunities for virtual field experience. The development of these types of learning and skills began with the selection of a classroom routine that engages teachers in pedagogical, content, and the more specific and intersecting pedagogical content knowledge (Shulman, 1986) and connects students to essential content and skills for the 21st century (e.g., the "4Cs," National Education Association, 2012).

BACKGROUND

Number Talks are a K-12 mathematics classroom routine that engages students in 5- to 15-minute discussions about the mental mathematics strategies used to solve intentionally designed computational problems (Humphreys & Parker, 2015; Parrish, 2010; Parrish & Dominick, 2016; Sun et al., 2018). These "short, mathematical, whole-class discussions during which students solve problems and share their ways of seeing and reasoning about mathematics" (Gerstenschlager & Strayer, 2019, p. 363) were first introduced in the mid-1990s (Humphreys & Parker, 2015). General internet searches of "Number Talks" deliver millions of results, reflecting popularity and interest that has grown over the past few decades (Flick & Kuchey, 2015). Matney et al. (2020) referred to the proliferation of Number Talks "among teachers, schools, districts, within professional development communities, and on social media" (p. 1) and the common acceptance of Number Talks as an effective classroom instructional routine.

For a Number Talk, teachers typically select or design problems to be solved mentally (in the sense of Parrish's (2010) *Number Talks: Helping Children Build Mental Math and Computation Strategies,*

Related Content

A Learning Theory Rubric for Evaluating Mobile Learning Activities

David Parsonsand Kathryn MacCallum (2020). *Mobile Devices in Education: Breakthroughs in Research and Practice (pp. 983-998).*

www.irma-international.org/chapter/a-learning-theory-rubric-for-evaluating-mobile-learning-activities/242657

Designing Distance Learning Tasks to Help Maximize Vocabulary Development

John Paul Loucky (2012). *International Journal of Virtual and Personal Learning Environments (pp. 35-58).*

www.irma-international.org/article/designing-distance-learning-tasks-help/67116

Students' Performance Prediction in Higher Education Using Multi-Agent Framework-Based Distributed Data Mining Approach: A Review

M. Nazir, A. Noraziahand M. Rahmah (2023). *International Journal of Virtual and Personal Learning Environments (pp. 1-19).*

www.irma-international.org/article/students-performance-prediction-in-higher-education-using-multi-agent-framework-based-distributed-data-mining-approach/328772

Identification of Key Issues in Adopting a Web 2.0 E-Portfolio Strategy

Gary F. McKennaand Mark H. Stansfield (2013). *International Journal of Virtual and Personal Learning Environments (pp. 49-64).*

www.irma-international.org/article/identification-key-issues-adopting-web/76373

Instructional Design Considerations, Challenges, and Best Practices on Cross-Cultural Adult Web-Based Learning Experiences in Higher Education

Cyd W. Nzyoka Yongo (2019). *Handbook of Research on Cross-Cultural Online Learning in Higher Education (pp. 335-363).*

www.irma-international.org/chapter/instructional-design-considerations-challenges-and-best-practices-on-cross-cultural-adult-web-based-learning-experiences-in-higher-education/226520