

Integrating Multimedia Animations to Support Common Core State Standards in Mathematics Classrooms

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EXECUTIVE SUMMARY

Multimedia animations offer students the context required to apply mathematical concepts to support their understanding. This chapter shares information about the NSF-funded Math Snacks, short animations designed to target specific math concepts that students may find difficult, including ratio and proportion. Additionally, the authors offer research-based guidelines for integrating these animations in the math classroom in a way that supports the Standards for Mathematical Practice. The chapter concludes with an introduction to the support materials available at www.mathsnacks.org for teachers who wish to use animations to support the Common Core State Standard for Mathematics in the middle grades.

INTRODUCTION

Multimedia animations offer realistic situations that apply mathematical concepts to support students' understanding. Bad Date for instance, is a multimedia animation that follows a young woman who wants to date someone who speaks at a 1:1 ratio with her. In the first situation, she speaks at a ratio of 1 word to her date's 7 words; in the second situation, the ratio is 6:1; and finally in the third date, she says 57 words and her date says 56 words. He shouts "*bread*" in the final moment to yield a perfect ratio of 1:1.

Bread! Wouldn't it be great if this one word were able to remind students of the meaning of a one-to-one ratio? Well, when students see the *Math Snacks* animation Bad Date, it does. *Math Snacks* animations and video games offer students an environment in which key mathematics concepts involving ratios, scale factors, measurement, and proportions are presented in such a way that students are able to relate memorable moments or words like "bread" with a mathematical concept. *Math Snacks* animations are designed to target specific concepts that students usually find difficult to learn and yet are crucial to their continued progress in mathematics. In addition, students do not have enough time to "play" with the concept in their schooling and they jump directly to operations with fractions without having a clear understanding of these types of numbers (Kieren, 1990; Lamon, 1999). As a result, students have difficulty interpreting " a/b " as a measure, operator, quotient, and, as a ratio or rate (Lamon, 2012). Specifically regarding proportionality, *Principles and Standards for School Mathematics* (NCTM, 2000) emphasizes that students should work with ratio and proportion, percent, similarity, and scaling. Moreover, ratio and proportional relationships are also key components of the CCSS for Mathematics in sixth and seventh grade.

The *Math Snacks* research and development team at New Mexico State University has developed six animation lessons to address students' need for a deeper understanding of ratio and proportion. Each of the animation lessons includes three different components: a multimedia animation, a hands-on activity, and a written learner guide. These three lesson elements provide students with a situative perspective regarding the math concept (Greeno, 2003; Sawyer & Greeno, 2009), which is supported by the Standards for Mathematical Practices (CCSSI, 2010). The CCSSI encourages math teachers to help students to make sense of problems, reason abstractly, construct viable arguments, and most importantly, model with mathematics. Each animation lesson includes discussion prompts, bonus activities, and a two-page learner guide to further develop student understanding by providing them the opportunity to apply the mathematics in various contexts. Each lesson component includes questions to assess understanding, as well as open-ended questions for students to relate the concepts to their own life experience. In summary, the three

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