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Web-based games to master core skills in introductory college mathematics.

Numerous games have been proposed to improve mathematics learning outcomes, but with mixed results. A shortcoming is that most games merely plug math problems into a generic game framework, such as into a quiz-based game, a first-person shooter game, or an adventure game. The efficacy of learning through such games is unproven, and some would argue is a bit insulting to the student, especially college students. Meanwhile, education research emphasizes the importance of repetition for skills mastery. Yet homework systems that dryly enforce repetition can lead to disenchanted, anxious, and/or fatigued students. As a partial solution, we are developing engaging web-based math games specifically designed to help students build mastery of core skills. Each game is uniquely created to inherently teach the specific math concept. A solve-for-x game teaches balance by involving a see-saw, yielding more points for quick balance. A tetris-like multiply-terms game involves combining terms to create a goal term, causing the player to automatically recognize that coefficients multiply and exponents add. Similarly for intervals, $mx + b$, and more. Trial use by hundreds of students at our university has yielded highly-positive feedback. We intend to make the games freely available on the web. (Received September 16, 2016)