

# 21st century game design: A model and prototype for promoting scientific problem solving

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**Abstract:** Many people are interested in developing instructional games to engage today's 21st century learners, and many others see games as a means of teaching problem solving and critical thinking, especially in math and science. However, the process required for developing a game that is both engaging and instructionally effective remains elusive. We have taken an interdisciplinary approach driven by sound theory in problem solving, game software design, instructional design, and teacher education to develop a game to teach scientific problem solving for middle school students. The game is currently in the prototype stage, with a partially playable version of the first scenario. We have also developed a series of design documents and heuristic tools for game scenario design based on existing practice in software design, instructional design, and the 3C3R problem design model [1-2]. We are also incorporating achievable AI via algorithmic programming [3] that both support learning and gaming feedback principles but which is also feasible for low budget, resource-challenged designers of serious games. It is our hope that this model can serve as an example for developing effective serious games that are engaging and able to achieve relevant learning outcomes within the real-world constraints of public education.

**Author Keywords:** Educational games; Instructional game design; K-12; Problem solving; Science inquiry; Serious games

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