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Scaffolding game-based learning: impact on learning achievements, perceived learning, and game experiences.

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Summary: One of the central challenges of integrating game-based learning in school settings is helping learners make the connections between the knowledge learned in the game and the knowledge learned at school, while maintaining a high level of engagement with game narrative and gameplay. The current study evaluated the effect of supplementing a business simulation game with an external conceptual scaffold, which introduces formal knowledge representations, on learners' ability to solve financial-mathematical word problems following the game, and on learners' perceptions regarding learning, flow, and enjoyment in the game. Participants ($M_{\text{age}} = 10.10$ years) were randomly assigned to three experimental conditions: a "study and play" condition that presented the scaffold first and then the game, a "play and study" condition, and a "play only" condition. Although no significant gains in problem-solving were found following the intervention, learners who studied with the external scaffold *before* the game performed significantly better in the post-game problem-solving assessment. Adding the external scaffold before the game reduced learners' perceived learning. However, the scaffold did not have a negative impact on reported flow and enjoyment. Flow was found to significantly predict perceived learning and enjoyment. Yet, perceived learning and enjoyment did not predict problem-solving and flow directly predicted problem solving only in the "play and study" condition. We suggest that presenting the scaffold may have "problematized" learners' understandings of the game by connecting them to disciplinary knowledge. Implications for the design of scaffolds for game-based learning are discussed.

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