

Name: Beatriz de Abreu

Degree: Master of Science Interactive Digital Media

Research paper title: Playing non-educational logic puzzles as STEM incidental learning activities: An analytical approach based in entertainment and engagement value

Supervisor: Dr. Mads Haahr

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Abstract

Game-based learning can be a powerful tool to improve students' motivation, information retention and problem-solving skills. Problem-solving skills are key when it comes to programming, as well as various mathematics domains, and there is a strong connection between the ability to solve puzzles and the ability to solve industry problems. Nonetheless, many of the currently available educational games fail as either learning activities or game experiences. Logic puzzle games' focus falls upon the game rules, thus compelling the player to employ logic notions to solve them. Hence, the gameplay fully revolves around the complexity of a logic paradigm, stemming from the effects of the core game mechanic. Therefore, we focus on well-designed and entertainment-centred logic puzzles and investigate their potentiality as incidental learning activities. Instead of postulating game design features that may be useful for education, we reverse-engineer four high user-rated puzzle games with a logic-derived gameplay and propose learning outcomes and assessment methods for each of them as learning activities. Provided that well-constructed puzzles are thought to be capable to train the user's mind and improve their problem-solving skills by challenging them with unusual dilemmas, and that playing games satisfies the player's need for achievement and keeping up with the challenge is a key reason for playing games, our aim is to understand if rationale-defying, yet entertainment-centred puzzles, can produce valuable incidental learning outcomes, thus correlating the acquisition of metacognitive problem-solving strategies to playing puzzle games.

Keywords: Puzzle, Logic Puzzle, Educational Game, Game-based Learning, Learning Objectives, Cognitive Abilities, STEM Learning, Logical Thinking