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COLLABORATION STRUCTURES AND COMPUTATIONAL ENGAGEMENT IN DIGITAL GAME-BASED LEARNING

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Abstract

This study examined how different collaboration structures shape students' computational thinking (CT) engagement in a digital game-based learning environment. Forty-eight seventh-grade students played a CT game in pairs and were assigned to either a turn-taking collaboration condition or a role-based collaboration condition. Students' written in-game discourse was collected and analyzed using Epistemic Network Analysis (ENA) to examine co-occurrences among CT-related discourse codes. The findings showed distinct interaction patterns between the two collaboration

conditions. Students in the role-based condition demonstrated stronger connections among CT components, particularly between pattern recognition and debugging, suggesting more coherent problem-solving processes. In contrast, students in the turn-taking condition showed stronger associations between debugging and off-task discussion, indicating that shifting control may interrupt continuity and increase disengagement. These results suggest that role-based collaboration may provide clearer responsibility structures that support sustained CT engagement. Future research may further examine how role design influences collaborative learning processes, CT development, and learning outcomes in digital game-based learning.

Keywords:

Computational Thinking, Digital Game-Based Learning, Epistemic Network Analysis, Collaboration, Role-Based Learning