Revoicing, Bridging, and Stuttering Across Formal, Physical, and Virtual Spaces

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ABSTRACT

As digital games and simulations become more commonplace in educational settings, it is important to document and analyze the way such digital learning environments merge with the traditional discourses and spaces of classroom-based learning environments. The current study contributes toward this goal by analyzing a representative transcript from a veteran traditional teacher’s discussion with her class about the Newtonian relationships at the heart of a digital learning game she has integrated into her physics curriculum. This article presents an interaction analysis of the material, virtual, and abstract spaces employed and navigated across by the teacher to clarify common challenges as well as opportunities. The authors then analyze subsequent transcripts of student-teacher interactions for evidence of impact on student learning and understanding.

KEYWORDS

Classroom-Based Learning Environment, Digital Learning Environment, Discourse Analysis, Interaction Analysis, Newtonian Relationships, SURGE

INTRODUCTION

Digital games provide a promising medium for science education (Honey & Hilton, 2010; Martinez-Garza, Clark, & Nelson, 2013). The potential of digital games as a genre of educational technologies for fostering scientific expertise has been noted not only by educators but also by scientists (Federation of American Scientists, 2006; Hines, Jasny, & Mervis, 2009). Integrating digital games into the classroom, however, poses new challenges for teachers (Martinez-Garza & Clark, 2013; Van Eaton & Clark, 2015). The current study contributes to our understanding of these challenges by analyzing a representative transcript from a veteran traditional teacher’s discussion with her class about the Newtonian relationships at the heart of a digital learning game she has integrated into her physics curriculum; in doing so, our aim is to ascertain challenges faced by teachers when bridging concepts students encounter in a digital game with the more formal concepts explicitly taught as part of the grade-level curriculum. We further contextualize this transcript and explore its implications in the context of interviews with students at the end of that curricular unit. To do so, we first present an interaction analysis (Jordan & Henderson, 1995; Goffman, 1983) of the material, virtual, and abstract spaces employed and navigated across by the teacher to clarify common challenges, as well as opportunities in her transcript. Analysis of these spaces provides additional insight into the ways in which the teacher seeks to bridge concepts between the digital game and formal concepts of the curriculum.

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Our analysis then turns to students’ discourse and the impact of the teacher’s discourse moves on student discourse and learning. Analyzing this impact is especially important due to the role that students’ discourse plays in challenging the teacher to make explicit connections between concerts in the game and concepts in the formal curriculum. To assess this impact, we conduct three analyses. First, we continue to examine the excerpt from whole-class instruction in which the teacher’s incomplete bridge has consequences for a student’s ability to engage with content from gameplay on a conceptual level. Second, we analyze student discourse from post-gameplay interviews to further examine the impact of the teachers’ discourse on students’ conceptual engagement with content during gameplay. The second analysis explores patterns in students’ ability to bridge formal definitions of Newtonian relationships with appropriate digital representations from gameplay. Third, and finally, we explore whole-class trends in students’ procedural and conceptual engagement with content during gameplay using a quantitative analysis of student and teacher discourse during classroom instruction over the four days of the study.

Five implications are foregrounded across the analyses: (1) classrooms are becoming increasingly multi-spatial, (2) teachers bring existing resources when teaching with digital games, (3) bridging is a core practice of teaching with digital games, (4) applying a perspectival framing lens (Greeno & van Sande, 2007; van Sande & Greeno, 2012) consequentially and productively shapes the metaphor for teaching and learning in rich multi-spatial classrooms, and (5) the ability of the teacher to construct effective bridges affects students’ ability to construct bridges between the digital learning environment and course content, shaping whether the student is able to engage with the material conceptually or solely at a procedural level within the digital environment.

THEORETICAL BACKGROUND

Multimodal Interactions in Place-Events

Interaction analysis (Jordan & Henderson, 1995; Goffman, 1983) is an interdiscipli...
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Game Design and the Challenge-Avoiding, Self-Validator Player Type
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Game-Based Instruction in a College Classroom
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