Chapter 10

Game–Informed Cooperative Assessments and Socially Responsible Learning in Public School Math Classes

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ABSTRACT

This chapter draws upon data from an ongoing seven-year study of game-informed and game-based learning in public high school math classes in the northeastern United States. The researcher has worked closely with the same math teacher and his students to develop and refine a cooperative testing approach piloted and integrated into in the teacher's math classes since 2017. For this study, data from students' post-cooperative assessment reflections, along with hundreds of hours of classroom observation and eight student interviews, suggest that the cooperative features inherent in videogaming and esports can support a revised approach to assessing learning, one which honors social responsibility and meaningful learning.

INTRODUCTION

The word, compete, is derived from the Latin word, *competere*, which means to "strive in common, strive after something in company with or together," as well as "to meet or come together" (Compete, 2021). This definition suggests that competing originated in activities that occurred cooperatively and in conjunction with others; competing was not an isolated or independent activity. This chapter, which focuses on the ethos of cooperative competition in high school math classes, calls attention to the importance of striving together. Esports research (Freeman & Wohn, 2017; Lipovaya et al., 2018) identifies the role of striving together through communication, collaboration, and strategizing, and, although the study reported in this chapter is not specific to esports, there are parallels that can be drawn when one consid-

ers the *application of a game ethos* to teaching and learning. When concepts inherent in videogaming, in general, and esports, in particular, are applied to a nondigital classroom assessment setting, there are opportunities for students to learn *through* the assessment, just as videogamers hone their craft through game play. What is more, there is a socially responsible nature to such cooperative work.

Before exploring a game ethos—marked by students striving together through cooperative competition—it is necessary to explain how classroom-based research and implications figure into this overall argument. In what follows is a discussion about assessment and anxiety, which helps to situate the need for cooperative forms of assessment and to underscore how and why a game ethos—inherent in esports and in the featured empirical research—is central to an important paradigm shift needed in education. Thereafter, additional information about the study and the nature of the cooperative assessment will be addressed.

WORKING WITHIN AND AGAINST AN ASSESSMENT CULTURE

Meaningful learning is not simply knowing *what* an answer is, but, rather, understanding *how* to reach that answer. Problem solving and recognizing possible routes to a solution, therefore, become central to meaning making, in general, and to meaning making in math class, in particular. The National Council of Teachers of Mathematics (NCTM) publications continue to highlight the need for students to develop their abilities "to reason and make sense of mathematical situations" (Martin et al., 2009, p. 4), "to be an informed citizen and consumer" (Executive Summary, n.d., p. 4), and to communicate "technical knowledge through oral and written formats" (Lommatsch, 2017, p. 112). Furthermore, NCTM Process Standards emphasize persevering through problem solving; creating, supporting, and critiquing arguments; developing flexible thinking; and applying mathematical thinking to everyday scenarios (Executive Summary, n.d.). Although life-long learning and social responsibility might be embedded in these and related core learning standards, the connection between mathematical thinking and social responsibility needs greater attention.

Traditional forms of assessment—often isolated events wherein a student individually completes a digital or nondigital test—provide a snapshot of what that student knows (or how the student interprets the test) at a particular point in time. Rarely does a traditional exam or summative assessment, which focuses on the final answer, provide thorough insight into how the student derived the answer. Additionally, rarely do traditional assessments involve the "soft failure" found in videogames (Laughlin & Marchuk, 2005, p. 25; Vallet, 2016), wherein players can learn from their mistakes by respawning or restarting the game. Rather, with traditional assessments "whether it is a poor grade or simply a red mark on homework, the failure is an end in itself" (Laughlin & Marchuk, 2005, p. 25). Thus, it comes as no surprise that "assessment via testing/correct answers" and "students work[ing] individually" are factors associated with mathematics anxiety among students (Finlayson, 2014, p. 100), and that the "focus on standardized tests has created a culture of anxiety in many schools" (Lobman, 2014, p. 330).

The Programme for International Student Assessment (PISA) report indicated that test anxiety was prevalent among adolescents across the globe and "anxiety about schoolwork, homework and tests is negatively related to performance in science, mathematics, and reading" (OECD, 2017, p. 10), a finding echoed in a meta-analysis of math anxiety and performance. More specifically, Namkung et al. (2019) noted that previous cognitive research (Aschraft & Kirk, 2001; Eysenck & Calvo, 1992; Miller & Bichsel, 2004) revealed a "one-way relation [in which] MA [mathematics anxiety] consumes (or even depletes)

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