Chapter 18
Using Commercial–Off–the–Shelf Video Games to Facilitate Habits of Mind: Spore™ in the Seventh Grade Life Science Classroom

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ABSTRACT
The purpose of this chapter is to provide a theoretically based argument for using commercial-off-the-shelf (COTS) video games to teach life science topics in the seventh grade science classroom. Specifically, the game Spore™, a turn-based strategy game, will be examined as a potential tool and environment for cultivating knowledge building and model-based reasoning. Though the diversity in methods of the reasoning processes are great and varied, researchers believe that “scientists’ work involves building and refining models of the world” (Lehrer & Schauble, 2006, p. 371). The argument forwarded is that Spore™, contextualized by purposeful efforts of instructors and researchers, may facilitate the development and refinement of scientific habits of mind and computational thinking. An exploratory case study derived from an overview of five sections of a seventh grade life science course (n=85), where a two-week lesson on evolutionary biology was significantly revised, illustrates opportunities for and challenges to incorporating COTS games into formal middle school science classroom.

INTRODUCTION
Although there is a long historical national debate regarding school reform in America, many are now suggesting that digital media could be leveraged to improve middle school education, particularly with increased emphasis in four core areas referred to as STEM topics – science, technology, engineering, and mathematics. A case in point are the efforts spurred by the MacArthur Foundation, which in 2006 launched a five-year $50 million digital media and learning initiative to develop and investigate emerging communication and computational technologies in the lives of youth, both inside and outside of school. A specific media type – digital video games – has recently garnered significant
attention within this new agenda. As Shaffer, Squire, Halverson, and Gee (2004) argue: “Video games are a powerful new medium with potential implications for schooling” (p. 14).

Thus, the purpose of this chapter is to provide a theoretically based argument for using commercial-off-the-shelf (COTS) video games to teach life science topics in the seventh grade classroom. In particular, Spore™, a turn-based strategy game, will be examined as a potential tool and environment for cultivating knowledge building and scientific habits of mind. Though the diversity in methods of the reasoning processes associated with habits of mind are great and varied, researchers believe that “scientists’ work involves building and refining models of the world” (Lehrer & Schauble, 2006, p. 371). The argument is that a commercial game such as Spore™ may facilitate the development and refinement of syntactic and emergent models of reasoning if properly contextualized with strategies, tools, accommodations, and assessments. Syntactic models summarize the essential functions of a system and map relationships while emergent models require predictions and implications of dynamic systems – a critical aspect of scientific inquiry and discovery.

To place games such as Spore™ in proper context, COTS games can be evaluated from two perspectives - as a polished artifact (much like film or textbook) being brought in from the outside (exogenous) or as an emergent artifact (much like a discussion board or wiki) developed from within the classroom (endogenous). Richard Halverson (2005) explains this simple dichotomy as follows. **Exogenous games** are easy to create but “not intrinsically related to the learning content.” Exogenous games are often “off-the-shelf” titles such as Civilization™ that were built for entertainment purposes and thus require much innovation and time on the part of the teacher to locate appropriate places in the curriculum for use. **Endogenous games** “seek to simulate relevant practices of the target environment in the structure of the game” (Halverson, 2005, p. 2). The value of endogenous games is that they are designed with a specific subject domain and curriculum in mind. Thus, the adoption of these titles may be more likely as there are clear ties to teaching objectives. The argument put forth in this chapter is that the distinction is not as clear as one might first assume. Moreover, the availability of endogenous games is far exceeded by exogenous titles. A case in point is Spore™: though certainly developed as a form of entertainment, the title has features unlike comparative titles, which will be described in more detail below. A simple example for now is that the game is based on the idea of being “massively, single player,” meaning that sharing and exchange are built into game play though not mandatory if one chooses. The ability to connect with other players through a feature called the Sporepedia (a dynamic encyclopedia of creations contributed by the global network of players that can be annotated, freely exchanged, and commented on by others), and thus introduce an unknown variable into game play may allow for modifications that lend to unprecedented instructional treatments if placed in the hands of creative teachers and enthusiastic students motivated to innovative learning. It is in these ways that the distinction between exogenous and endogenous games may begin to break down, becoming more problematic, more complex and thus worthy of further investigation.

With this potential in mind, science teachers and educational researchers are beginning to contemplate the importance of digital video games in the classroom. Although the how of learning in these environments is well documented, the what is still elusive. That is, the issue of transfer remains one of the most sought after explanations in the games-for-education literature. Critics of digital game-based learning point out that an insufficient number of rigorous, empirical studies have begun to resolve the transfer issue. Consequently, a logical next step is to explore what knowledge and strategies might be learned (and, subsequently, transferred) in these complex digital environments.
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