Chapter 11
Development of Interdisciplinary Problem-Solving Strategies through Games and Computer Simulations

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EXECUTIVE SUMMARY

The purpose of this chapter is to provide two case studies examining how games and computer simulations can be used to link different disciplines in the setting of a college education for underrepresented, urban undergraduate students. The first case study illustrates how researchers from different disciplines collaborate to advance our understanding of the physiology of normal and diseased hearts. Computer simulations provide a link between an understanding of biological systems at different scale levels, from molecules to organs, making it possible to create a superior systemic (non-reductionist) representation. Problems in science and engineering require interdisciplinary thinking, so it is crucial that the next generation of researchers/professionals develop an interdisciplinary approach to problem solving. The second case study shows how computer games can be used to develop programming problem-solving and narrative skills by linking English composition with computer programming courses.

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ORGANIZATION BACKGROUND

New York City College of Technology (City Tech) of the City University of New York seeks to develop interdisciplinary problem-solving strategies to shape a pedagogical experience that best fits its diverse and vibrant talent. With a Fall 2011 enrollment of 15,963, City Tech is one of most diverse institutions of higher education in the Northeast: 32.5% of students are Black, 33.2% Hispanic, 19.2% Asian/Pacific Islander, 11.2% white, 0.5% Native Americans/Native Alaskan, and 3.4% Other.

SETTING THE STAGE

City Tech students usually understand the requirements of their major, especially in technical fields like computer systems technology. However, they do not understand and often question why general education courses, including science and English, are relevant to their education. Consequently, students do not bridge and transfer what they learn in the course of their major and in the general education courses. We will present two cases studies with the common thread on how computer simulations and games can be used to bridge knowledge from different disciplines. In the first case, "An Interdisciplinary Understanding of the Heart," we will illustrate how researchers from different disciplines collaborate to advance our understanding of the physiology of normal and diseased hearts. Computer simulations provide a link between our understanding of biological systems at different scale levels and different disciplines, making it possible to create a systemic (non-reductionist) representation of the heart. This example could be used to link courses in mathematics, physics, chemistry, biology, and computer systems. Later, in the second case, "Development of Problem-Solving Skills by Creating Video Game Narratives," we will present a case study on how courses in Computer Systems and English could be linked using games and computer simulations, so students understand better how different disciplines connect to each other. Games and computer simulations not only will help students develop interdisciplinary strategies to problem solving but will also provide a mechanism to bridge the abstract (theory) to the concrete (hands-on exercises).