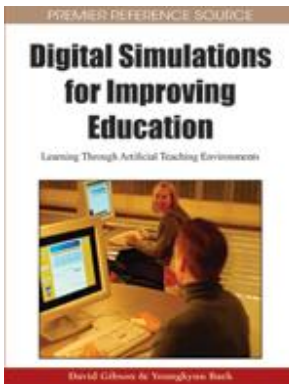


**DIGITAL SIMULATIONS FOR IMPROVING EDUCATION:
Learning Through Artificial Teaching Environments**
Gibson, David, Ed.D.; Information Science Reference, Hershey, PA,
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Simulations in education, both for children and adults, become popular with the development of computer technology, because they are fun and engaging and allow learners to internalize knowledge by applying new skills in a risk-free environment.

This book offers trainers and educators the information and perspective about instructional simulations. What is simulation? What are the underlying considerations designing instructional simulation? How could simulation be used for improving teaching and learning? What are the case studies? How are graduate students engaged on teams to create new games? The book's broader audience is anyone who is interested in potential of games and simulations for improving teaching and learning. If you are looking this book with an eye of computer programmers or technical designer, this book is not primarily for you. The book is edited by David Gibson who is project co-director of simSchool, a classroom flight simulator for training teachers and Young Baek who is a Professor of Educational Technology at Korea National University of Education. It consists of 514 pages (+xxv) covering 24 articles divided into six sections and provides information about context for simulation, design considerations of instructional simulation, case studies focused on improving teaching and student learning, and engaging graduate students in development process. Topics covered in the book are as follows: Alternate reality games as simulations, Case studies in teaching and learning, Cognitive apprenticeship inspired simulations, Combining instructional design and game design, Computers and the end of progressive education, Design principles for embedded formative assessments, Designing commercial simulations for teachers, Digital games to develop ethical teachers, Digital simulation in teaching and learning, Game design and development, Hybrid 2D/3D development of interactive simulations, Learning by doing via game making, Modeling classroom behaviors in software agents, Narrative event diagram, Simulating teaching experience with role-play, Simulation for improving teachers' motivational skills, Supporting open-ended assignments in virtual environments, Teacher problem solving using simulation, Virtual spaces for teaching and learning.

The aim of first section, consists of four chapters, provides an introduction and presents context for simulation for those interested in using or designing them for instructional purposes. It gives definitions structure and characteristics of discrete and continuous simulations and highlights effective simulation's features for teaching and learning. It mentions challenges and look into examples of digital educational simulations such as Max Trax, Strategy, CoPilot, Virtual School, simSchool, simClass, Krucible and Starry Night. A broad taxonomy for thinking about interactions within virtual environments for learning is conceptualized as a "cubic structure" of three kinds of interactions: learner with content, learner with instructor and learner with learner to help organize the complex problems. Finally in this chapter multiculturalism is argued with a philosophical view. After having read this section, readers will have a clearer picture of what simulations are and how they can be used for educational purpose.

Main question about designing an instructional simulation is how a designer can add instruction to a game or simulation without reducing or removing the fun of playing it? Section II, which consists of seven chapters, focuses on designing considerations. First main idea that is emphasized in the section is that joining game design elements (e.g., rules, goals and objectives, outcomes and feedback, conflict and challenge, interaction, representation or story) with ISD elements (e.g., analysis, design, development, implementation, evaluation) requires instructional game designers to have a double view, to be able to merge two mental models into one. After that with the Narrative Event Diagram, a tool for designing professional simulations, a narrative framework offered a common ground for building a learning environment with a diverse team. Thirdly COVE model that integrates ideas from learning theory, cognitive science, computational neuroscience, complex systems and artificial intelligence is given. In the following chapter, a method for delivering web pages that combines two and three-dimensional objects are given. And finally, several examples of using case studies as the narrative or back story for video game design and development are presented.

A good deal has been written on if a game or simulation could teach a teacher and improve as an instructor in section III which consists of seven chapters. Firstly, teacher problem solving using simulation is explored. Secondly, concepts and elements needed for a simulation that can be used by teachers in training for enhancing their skills in motivating students are outlined. Then design principles (reusability, ease of maintenance, and overall effectiveness of similar products) and challenges in designing commercial simulations for teacher professional development are provided. In the following chapter, it is emphasized that the value of role-play simulations for preservice teachers is to safely engage in the everyday communicative actions that make up teaching that range from negotiation and construction of knowledge to communication of student roles and norms. After that, theory, structure, and development process used in designing a teaching simulation is presented. simClass is used as an example. Next, potential game mechanics and design considerations are given for game creators and teacher educators to use when building ethics games and simulations for teachers. Finally, with using Squeak Etoys the process of adopting and using this new technology in the K-12 classroom is outlined by focusing on helping teachers create models and problem-based learning lesson plans correlated with state curriculum standards.

In section IV of this book, chapters focus on the educational value of learning experiences through simulations. Firstly, framework for the design and development of an educational experience aimed at fostering global thinking and real-world Simulations in education, both for children and adults, become popular with the development of computer technology, because they are fun and engaging and allow learners to internalize knowledge by applying new skills in a risk-free environment.

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In Section V, the question of how making modifications of an existing game can be a learning tool for students is explored and step-by-step outline is given. Engaging graduate students on teams to create new games, design process through the use of teachers as content experts, the process of designing for middle schoolers, and the resulting impacts on middle school science teachers, the graduate students and school administrators, teachers and students during design and implementation are further explored. Because teaching and learning are complex phenomena, a complex system framework is needed in the design of simulation engines and representations aimed at improving education. From the simSchool simulation core ideas of complex systems are presented in final section.

The growth of simulations as an interactivity rich learning environment seems to be assured for the foreseeable future. Hence the value of this book, based on research and representing practice in fields of designing simulations, teaching and learning.