

GAMING AND SIMULATIONS

Concepts, Methodologies, Tools and Applications



Gaming and Simulations: Concepts, Methodologies, Tools and Applications

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Preface

Simulation and gaming is a promising, and rapidly-expanding, field of study. This new methodology is being adopted in a wide variety of disciplines. Complicated computer models have helped inform everything from finance to engineering, a new wave of “serious games” have begun to change the way we think about gaming as a tool for learning, and true-to-life simulations have changed the way professionals train for intensive, on-the-job skills.

The research on simulations and gaming is constantly changing, making it challenging for experts and practitioners to stay informed of the field’s most up-to-date research. That is why Information Science Reference is pleased to offer this three-volume reference collection that will empower students, researchers, and academicians with a strong understanding of critical issues within gaming and simulation by providing both broad and detailed perspectives on cutting-edge theories and developments. This reference is designed to act as a single reference source on conceptual, methodological, technical, and managerial issues, as well as provide insight into emerging trends and future opportunities within the discipline.

Gaming and Simulations: Concepts, Methodologies, Tools and Applications is organized into eight distinct sections that provide comprehensive coverage of important topics. The sections are: (1) Fundamental Concepts and Theories, (2) Development and Design Methodologies, (3) Tools and Technologies, (4) Utilization and Application, (5) Organizational and Social Implications, (6) Managerial Impact, (7) Critical Issues, and (8) Emerging Trends. The following paragraphs provide a summary of what to expect from this invaluable reference tool.

Section 1, ***Fundamental Concepts and Theories***, serves as a foundation for this extensive reference tool by addressing crucial theories essential to the understanding of gaming and simulation. Chapters such as *An Overview of Gaming Terminology* by Clark Aldrich and Joseph DiPietro, and *Mobility, Games, and Education* by Michael A. Evans give an introduction and overview of gaming and simulation. *Video Games Revisited* by Patricia M. Greenfield revisits a landmark piece of scholarship originally written in 1994. Additional selections, including *The Path between Pedagogy and Technology* by Colin Price, and *Simulation in Teaching and Training* by Alke Martens focus on providing backgrounds and introductions to specific concepts within gaming and simulations. These and several other foundational chapters provide a wealth of expert research on the elemental concepts and ideas surrounding gaming and simulation.

Section 2, ***Development and Design Methodologies***, presents in-depth coverage of the conceptual design and architecture of games and simulations, focusing on aspects of learning and game design. Designing and implementing effective processes and strategies are the focus of such chapters as *Communicability in Educational Simulations* by Emma Nicol, and *Considerations and Methodology for Designing a Virtual World* by Brian Bauer. *Combining Instructional Design and Game Design* by Celina Byers discusses the benefits of combining elements of game design and instructional design by applying recent findings in cognitive psychology. With contributions from leading international researchers, this section offers copious developmental approaches and design methodologies for games and simulations.

Section 3, ***Tools and Technologies***, presents extensive coverage of the various tools and technologies used in the development of games and simulation. This comprehensive section includes such chapters as *An Intelligent Web-Based Human-Computer Interaction System with Natural Language CSIEC and its Integration into English Instruction*, by Jiyoun Jia, and *Design Principles for Interactive Learning Environments with Embedded Formative Assessments* by Sara Dexter, which describe various techniques and models for interactive learning systems. *Design and Evaluation of Embodied Conversational Agents for Educational and Advisory Software* by Elisabeth André provides guidelines and approved methods for the development of animated pedagogical agents. Finally, chapters such as *Hybrid 2D/3D Development of Interactive Simulations* by Penny deByl, and *Information and Visualization Imagery* by Shalin Hai-Jew presents research on digital simulations and imagery. In all, this section provides coverage of a variety of tools and technologies that inform and enhance modern research in gaming and simulations.

Section 4, ***Utilization and Application***, describes how games and simulations have been utilized and offers insight on important lessons for their continued use and evolution. Including chapters such as *Applied Training in Virtual Environments* by Ken Hudson and *Educational Gaming Avatars* by Colette Wanless-Sobel, this section investigates numerous methodologies that have been proposed and enacted in gaming and simulations, as well as their results. This section continues with a number of chapters exploring neural networks such as *Synchronization of Uncertain Neural Networks with performance and Mixed Time-Delays* by Hamid Reza Karimi and *Neural Network-Based Process Analysis in Sport* by Juergen Perl. Contributions found in this section provide comprehensive coverage of the practicality and current use of games and simulations.

Section 5, ***Organizational and Social Implications***, includes chapters discussing the organizational and social impact of gaming and simulation. *Culturally Responsive Games and Simulations* by Colleen Swain introduces the reader to the connection between culture and learning. *Fear of Flying and Virtual Environments* by Giovanni Vincenti examines how computer simulations can be used to treat patients suffering from phobias. *Simulation Technologies in Global Learning* by Robert Tennyson focuses on the role that simulations can provide in both the effectiveness and efficiency of training and education. This section continues with *The Application of 'Activity Theory' in the Design of Educational Simulation Games* by Paul Peachey, which offers suggestions as to how activity theory may be used in the design of computer simulation games directed at education. Overall, these chapters present a detailed investigation of the complex relationship between individuals, organizations and simulations.

Section 6, ***Managerial Impact***, presents focused coverage of gaming and simulations as it relates to improvements and considerations in the workplace. *Managerial Computer Business Games* by Luigi Proserpio investigates managerial learning through business games. Other chapters such as *The State of Computer Simulation Applications in Construction* by Mohamed Marzouk present an overview of computer simulation efforts that have been performed in the area of construction engineering and management. In all, the chapters in this section offer specific perspectives on how managerial perspectives and developments in games and simulations inform each other to create more meaningful user experiences.

Section 7, ***Critical Issues***, addresses vital issues related to gaming and simulations, which include customer relationship management, critical success factors and the business strategies. Chapters such as *A Qualitative Meta-Analysis of Computer Games as Learning Tools* by Fengfeng Ke, and *An Investigation of Current Online Educational Games* by Yufeng Qian discuss the success of educational games based on technology, people, and processes. Additional selections, such as *Building Interactive and Immersive Imagery* by Shalin Hai-Jew, *Making a Connection* by Dennis Charsky, and *Mitigating Negative Learning in Immersive Spaces and Simulations* by Shalin Hai-Jew address critical success factors in the deployment of games and simulations.

Section 8, ***Emerging Trends***, highlights areas for future research within the field of gaming and simulations, while exploring new avenues for the advancement of the discipline. Beginning this section

is *Knowledge Engines for Critical Decision Support* by Richard M. Adler which argues that tacit strategic performance-based knowledge can often be captured and deployed effectively, via frameworks that combine scenario planning methods with “what-if” simulation. Language Simulations *are* presented in *Language Simulations for Fostering Language Acquisition and Communicative Competence in Adult Second- Language Learners* by Angelene McLaren, and *Synthetic Biology as a Proof of Systems Biology* by Andrew Kuznetsov explores the merits of combining systems and synthetic biology. These and several other emerging trends and suggestions for future research can be found within the final section of this exhaustive multi-volume set.

Although the primary organization of the contents in this multi-volume work is based on its eight sections, offering a progression of coverage of the important concepts, methodologies, technologies, applications, social issues, and emerging trends, the reader can also identify specific contents by utilizing the extensive indexing system listed at the end of each volume. Furthermore to ensure that the scholar, researcher and educator have access to the entire contents of this multi volume set as well as additional coverage that could not be included in the print version of this publication, the publisher will provide unlimited multi-user electronic access to the online aggregated database of this collection for the life of the edition, free of charge when a library purchases a print copy. This aggregated database provides far more contents than what can be included in the print version in addition to continual updates. This unlimited access, coupled with the continuous updates to the database ensures that the most current research is accessible to knowledge seekers.

As a comprehensive collection of research on the latest findings related to using technology to providing various services, *Gaming and Simulations: Concepts, Methodologies, Tools and Applications*, provides researchers, administrators and all audiences with a complete understanding of the development of applications and concepts in gaming and simulations. Given the vast number of issues concerning usage, failure, success, policies, strategies, and applications of gaming and simulations in organizations, *Gaming and Simulations: Concepts, Methodologies, Tools and Applications* addresses the demand for a resource that encompasses the most pertinent research in gaming and simulations development, deployment, and impact.

List of Contributors

Abu-Taieh, Evon M.O. \ <i>Civil Aviation Regulatory Commission and Arab Academy for Financial Science, Amman, Jordan</i>	854
Abutayeh, Jeiham M.O. \ <i>World Bank, Jordan</i>	854
Adcock, Amy B. \ <i>Old Dominion University, USA</i>	409
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Akilli, Göknur Kaplan \ <i>Pennsylvania State University, USA</i>	150
Aldrich, Clark \ <i>SimuLearn, USA</i>	24
Alfredson, Jens \ <i>Saab AB, Aerosystems, Sweden</i>	1477
Alm, Torbjörn \ <i>Linköping University, Sweden</i>	1477
Anderson, Craig A. \ <i>Iowa State University, USA</i>	1807
André, Elisabeth \ <i>Universität Augsburg, Germany</i>	668
Antunes, Luis \ <i>GUESS/LabMag/Universidade de Lisboa, Portugal</i>	1530
Asgari, Mahboubeh \ <i>Simon Fraser University, Canada</i>	528
Babković, Kalman \ <i>University of Novi Sad, Serbia</i>	998
Baek, Youngkyun \ <i>Korea National University of Education, Korea</i>	229
Bai, Xin \ <i>City University of New York, USA</i>	440
Balsa, João \ <i>GUESS/LabMag/Universidade de Lisboa, Portugal</i>	1530
Barrett, K.A. \ <i>Alelo, Inc., USA & Distance Education Consultant, Los Angeles, USA</i>	1313, 1577
Bauer, Brian \ <i>Étape Partners, USA</i>	391
Becker, Katrin \ <i>Simon Fraser University, BC, Canada</i>	75
Belchior, Mairon \ <i>University of Fortaleza, Brazil</i>	1142
Belfore, Lee A. \ <i>Old Dominion University, USA</i>	409
Bennett, Elisabeth E. \ <i>Tufts University and Baystate Health, USA</i>	1914
Bizzocchi, Jim \ <i>Simon Fraser University, Canada</i>	1417
Black, John B. \ <i>Columbia University, USA</i>	440
Bloomfield, Peter \ <i>University of the West of Scotland, UK</i>	819
Borchert, Otto \ <i>North Dakota State University, USA</i>	1060
Borovac, Branislav \ <i>University of Novi Sad, Serbia</i>	998
Bouras, Christos J. \ <i>University of Patras, Greece</i>	898, 1108
Boyer, Jeff \ <i>University of Florida, USA</i>	1280
Breiter, Andreas \ <i>Institute for Information Management, University of Bremen, Germany</i>	426
Buraphadeja, Vasa \ <i>University of Florida, USA</i>	1750
Burgos, Daniel \ <i>ATOS Origin Research & Innovation, Spain</i>	1048
Byers, Celina \ <i>Bloomsburg University of Pennsylvania, USA</i>	359
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Charsky, Dennis \ <i>Ithaca College, USA</i>	1823
Chelberg, David \ <i>Ohio University, USA</i>	645
Chen, Shu-Heng \ <i>National Chengchi University, Taiwan</i>	867
Chen, Hui \ <i>Chinese Academy of Sciences and The Chinese University of Hong Kong, Hong Kong</i>	1160
Cheong, Donguk \ <i>Korea National University of Education, Republic of Korea</i>	574
Coelho, André L.V. \ <i>University of Fortaleza, Brazil</i>	1142
Coelho, Helder \ <i>GUESS/LabMag/Universidade de Lisboa, Portugal</i>	1530
Collins, Chris \ <i>University of Cincinnati, USA</i>	346
Connolly, Thomas M. \ <i>University of the West of Scotland, UK</i>	1763
Dawson, Kara \ <i>University of Florida, USA</i>	1750
de Freitas, Sara \ <i>University of Coventry, UK</i>	779
deByl, Penny \ <i>University of Applied Sciences, The Netherlands</i>	736
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Dexter, Sara \ <i>University of Virginia, USA</i>	687
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Dischinger, Ben \ <i>North Dakota State University, USA</i>	1060
Duan, Bing \ <i>Nanyang Technological University, Singapore,</i>	514
Durga, Shree \ <i>University of Wisconsin – Madison, USA</i>	1124
Edgar, Edmund \ <i>Social Minds Learning Systems, Japan</i>	819
Estes, Michele D. \ <i>James Madison University, USA</i>	1270
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Fernandez, Marcos \ <i>Universidad de Valencia, Spain</i>	296
Ferry, Brian \ <i>University of Wollongong, Australia</i>	956, 1460
Foster, Aroutis N. \ <i>Michigan State University, USA</i>	497
Franklin, Teresa \ <i>Ohio University, USA</i>	645
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Furtado, Elizabeth S. \ <i>University of Fortaleza, Brazil</i>	336
Furtado, Vasco \ <i>University of Fortaleza, Brazil</i>	336, 1142
Galarneau, Lisa \ <i>University of Waikato, New Zealand</i>	1874
Gallagher, Scott \ <i>James Madison University, USA</i>	1521
Garcia-Murillo, Martha \ <i>Syracuse University, USA</i>	910
Garcia-Ruiz, Miguel A. \ <i>University of Colima, Mexico</i>	1712
Gentile, Douglas A. \ <i>Iowa State University, USA</i>	1807
Giannaka, Eri \ <i>University of Patras, Greece</i>	1108
Goka, Masanori \ <i>Hyogo Prefectural Institute of Technology, Japan</i>	941
Gould, Helyn \ <i>University of Strathclyde, UK</i>	2013

Graham, Shawn \ <i>Grand Canyon University, USA</i>	1405
Greenfield, Patricia M. \ <i>University of California-Los Angeles, USA</i>	306
Griffiths, Mark \ <i>Nottingham Trent University, UK</i>	779
Guralnick, David A. \ <i>Kaleidoscope Learning, USA</i>	108
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Harper, Steven \ <i>James Madison University, USA</i>	1521
Higuera, J.F. Díez \ <i>University of Valladolid, Spain</i>	1200
Hobbs, Renee \ <i>Temple University, USA</i>	971
Hokanson, Guy \ <i>North Dakota State University, USA</i>	1060
Holton, Douglas L. \ <i>Utah State University, USA</i>	979
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Johnson, W. Lewis \ <i>Alelo, Inc., USA</i>	1313, 1577
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Jörissen, Benjamin \ <i>University of Magdeburg, Germany</i>	1251
Jung, Jae Yeob \ <i>Korea National University of Education, Republic of Korea</i>	1354
Kapralos, Bill \ <i>University of Ontario Institute of Technology, Canada</i>	1712
Karadimas, Petros \ <i>University of Patras, Greece</i>	1183
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Ke, Fengfeng \ <i>University of New Mexico, USA</i>	1619
Kee, Kevin \ <i>Brock University, Ontario</i>	1405
Kemp, Jeremy \ <i>San Jose State University, USA</i>	819
Kervin, Lisa \ <i>University of Wollongong, Australia</i>	956, 1460
Kim, Bokyeong \ <i>University of Virginia, USA</i>	574
Kinzer, Charles K. \ <i>Columbia University, USA</i>	1434
Kirkpatrick, Denise \ <i>The Open University, UK</i>	837
Koizumi, Satoshi \ <i>Osaka University, Japan</i>	2030
Kolesnikov, Maxim \ <i>University of Illinois at Chicago, USA</i>	724
Kolo, Castulus \ <i>Macromedia University of Applied Sciences, Munich, Germany</i>	426
Kuznetsov, Andrew \ <i>Freiburg University, Germany</i>	1981
Lee, Mark J.W. \ <i>University of Ballarat, Australia</i>	701
Levy, Christine \ <i>Kaleidoscope Learning, USA</i>	108
Li, Zhuo \ <i>University of Florida, USA</i>	1280
Ling, Keck Voon \ <i>Nanyang Technological University, Singapore</i>	514
Liu, Feng \ <i>University of Florida, USA</i>	1280
Liu, Chang \ <i>Ohio University, USA</i>	645
Livingstone, Daniel \ <i>University of the West of Scotland, UK</i>	819
Low, Renae \ <i>University of New South Wales, Australia</i>	1787
Lu, Zhao \ <i>Tuskegee University, USA</i>	889
MacInnes, Ian \ <i>Syracuse University, USA</i>	910

Magerko, Brian \ Georgia Institute of Technology, USA	1999
Magni, Massimo \ Bocconi University, Italy	1513
Maharg, Paul \ University of Strathclyde, UK	2013
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Martin, Miguel Vargas \ University of Ontario Institute of Technology, Canada	1712
Martinelli, Joseph \ Seton Hall University, USA	1774
Martínez-Zarzuela, M. \ University of Valladolid, Spain	1200
Marzouk, Mohamed \ Cairo University, Egypt	1554
McClellan, Phillip E. \ North Dakota State University, USA	1060
McLaren, Angelene \ Wayne State University, USA	1954
McLaughlan, Robert \ University of Technology, Sydney, Australia	837
Melo, Adriano \ University of Fortaleza, Brazil	1142
Menezes, Ronaldo \ Florida Institute of Technology, USA	1142
Meredith, Grant \ University of Ballarat, Australia	701
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Park, Hyung Sung \ Korea National University of Education, Republic of Korea	1354
Peachey, Paul \ University of Glamorgan, Wales, UK	1391
Peck, Blake \ University of Ballarat, Australia	701
Pendegraft, Norman \ University of Idaho, USA	1383
Perl, Juergen \ University of Mainz, Germany	1115
Pernas, F.J. Díaz \ University of Valladolid, Spain	1200
Piu, Angela \ University of L'Aquila, Italy	240
Potkonjak, Veljko \ University of Belgrade, Serbia	998
Pouloupoulos, Vassilis \ University of Patras, Greece	898
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Renaud, Lise \ <i>University of Quebec in Montreal, Canada</i>	168
Respício, Ana \ <i>Operations Research Center/GUESS/Universidade de Lisboa, Portugal</i>	1530
Resse, Debbie Denise \ <i>Center for Educational Technologies®, Wheeling Jesuit University, USA</i>	474
Rodríguez, M. Antón \ <i>University of Valladolid, Spain</i>	1200
Rogers, Luke \ <i>University of Ballarat, Australia</i>	701
Rowe, Jonelle \ <i>Department of Health and Human Services, USA</i>	971
Sansom, Mark S.P. \ <i>University of Oxford, UK</i>	628
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Sauvé, Louise \ <i>Télé-université, Canada</i>	168
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Snow, Randell \ <i>James Madison University, USA</i>	1270
Squire, Kurt \ <i>University of Wisconsin – Madison, USA</i>	1124
Stansfield, Mark \ <i>University of the West of Scotland, UK</i>	1763
Steinberg, Arnold D. \ <i>University of Illinois at Chicago, USA</i>	724
Steinman, Dolores A. \ <i>University of Toronto, Canada</i>	794
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Sun, Hanqiu \ <i>The Chinese University of Hong Kong, Hong Kong</i>	1160
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Section I. Fundamental Concepts and Theories

This section serves as the foundation for this exhaustive reference tool by addressing crucial theories essential to the understanding of games and simulations. Chapters found within these pages provide an excellent framework in which to position gaming and simulations within the field of information science and technology. Individual contributions provide overviews of the history of gaming and simulations, the impact of information systems on organizations, and overviews on various games and simulation processes. Within this introductory section, the reader can learn and choose from a compendium of expert research on the elemental theories underscoring gaming and simulation.

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Section II. Development and Design Methodologies

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