The Emerging Field of Simulation & Gaming: Meanings of a Retrospect

Jan H. G. Klabbers

Simulation Gaming 2001; 32: 471
DOI: 10.1177/104687810103200404

The online version of this article can be found at:
http://sag.sagepub.com/cgi/content/abstract/32/4/471

Published by:
SAGE
http://www.sagepublications.com

On behalf of:
Association for Business Simulation & Experiential Learning
International Simulation & Gaming Association
Japan Association of Simulation & Gaming
North American Simulation & Gaming Association
Society for Intercultural Education, Training, & Research

Additional services and information for Simulation & Gaming can be found at:

Email Alerts: http://sag.sagepub.com/cgi/alerts
Subscriptions: http://sag.sagepub.com/subscriptions
Reprints: http://www.sagepub.com/journalsReprints.nav
Permissions: http://www.sagepub.com/journalsPermissions.nav
Citations http://sag.sagepub.com/cgi/content/refs/32/4/471
The emerging field of simulation & gaming: Meanings of a retrospect

Jan H. G. Klabbers
KMPC
University of Bergen, Norway

The author presents a framework for addressing the state of the art and science in the field of gaming and simulation and an overview of topics covered by the articles that fit into this scheme. Many empty cells still have to be addressed. Such a synthetic perspective on inquiry allows the gaming and simulation community to accumulate understanding on the field by looking for commonalities. Differences between a disciplinary and transdisciplinary review are explored from the viewpoint of knowledge development in the social field of power. In that respect, designers and facilitators of games and simulations have to cope with putting their institutions at risk, as the form of knowledge generated through gaming and simulation (i.e., their social capital) may not count as recognizable currency. The articles give ample evidence of the related obstacles in research, teaching, and practice. Nevertheless, the articles show what has been accomplished and which major puzzles gamers still need to address to improve professional practice in research and education, in management and governance.

KEYWORDS: diachronic perspective; disciplinary review; social/cultural capital; synchronic perspective; transdisciplinary review.

The field of simulation and gaming that emerged since the 1950s has been developed and practiced by professionals from a variety of disciplines. Simulation and game design on the basis of varying tools such as paper, pencil, boards, computers, simulation software, multimedia hard- and software, the Internet, and so forth, has become a well-established field of inquiry and practice. To keep in mind the diversity of the field in the human and social domains, the International Simulation and Gaming Association (ISAGA) has developed the following frame of reference (see Table 1). In addition to this field, simulation and gaming methods are being used in the natural sciences such as physics, chemistry, biology, and engineering, especially by those who are active in advancing cybernetics, control theory, and systems science. In economics, mathematical game theory has gained a solid position among the many formal and empirical approaches.

As a consequence, the field of simulation and gaming represents a metadisciplinary view on a wide variety of questions in and approaches to the human and social domain. This diversity brings forward an enormous challenge for those entering the field to grasp the big picture. This is especially the case in a scientific tradition that stresses monodisciplinary rules of inference to research and a reductionist approach to complexity.
# TABLE 1: Realm of Gaming & Simulation

<table>
<thead>
<tr>
<th>Areas of interest (reference systems)</th>
<th>a. collective competence</th>
<th>b. individual competence</th>
<th>c. intra-, cross-cultural communication</th>
<th>d. learning &amp; education</th>
<th>e. management &amp; planning</th>
<th>f. organizational development</th>
<th>g. policy development</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Business</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Economy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Health care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Human/cultural resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Human services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. International relations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Military</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Natural resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Religion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Urban/rural settlements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. . . .</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Questioning the state of the art and science links various areas of research and education. As the articles will show, they offer a diachronic and synchronic perspective. Therefore, it is worthwhile to reflect on the meaning and purpose of a scientific review to characterize the typical character of knowledge development in gaming and simulation.

Multiple meanings of a retrospect

A review is a form of knowledge accumulation and generation. A synthetic perspective on inquiry allows the gaming and simulation community to accumulate understanding on the field by looking for commonalities in the literature. Gamers need to master conceptual, technical, discursive, and communicative competence, that is, cross-disciplinary, cross-cultural competence.

To understand the scope of gaming and simulation, the following frame of reference will be applied. I will distinguish between domain-specific theories and game theory, gaming as a tool or method (i.e., the schematic model of a game) and apparatus (i.e., a concrete game), and gaming as a session for experimenting with the tool. By paraphrasing Hacking (1999), the following can be said about gaming as a method of inquiry:

Game scientists have theoretical models, and speculative conjectures couched in terms of those models. They also have views about how gaming works and what you can do with it; how games can be designed, modified, adapted. Typically, the game does not behave as expected. The world resists. Scientists have to accommodate themselves to that resistance. They can do it by correcting the major theory under investigation, they can revise beliefs about how the game works and they can modify the game itself. The end result is a robust fit between all these elements. (p. 71)

Considering the variety of the field (see Table 1), many different theoretical models have to be taken into account. Whether they have in common a metatheoretical perspective remains an open question. Here lies a joint task for all those involved in the design of games and simulations.

Models, experiments, metaphors, design methods, evaluations, and debriefings have depicted the scholarly and practitioners' literature on gaming and simulation as the construction of a wall of graffiti. Reviews are architectural examinations of that wall (Graue & Grant, 1999). What images on gaming and simulation can be interpreted from this wall of graffiti? Approaches to research with and practical use of gaming and simulation have proliferated into a variety of disciplinary inquiries as well as cross-disciplinary views on their use. So what can the reader expect from a reflection on the state of the art, which more or less explicitly functions as a review? A review can focus on concurrent advances in a field depicting a synchronic perspective. It also can draw attention to advances in a single line of inquiry stressing a diachronic perspective.
Lather (1999, p. 3) points out that a review is gatekeeping, policing, and productive rather than merely mirroring. It is not exhaustive. It is situated, partial, and perspectival. Those who benefit from a review are the editor, the author, and the profession. The editor benefits by paying attention to the politics of what is put forward in the journal, what is at the center and what is marginal, and how the journal can contribute to the development of the field. The author benefits because it brings his or her work into more visibility. The profession benefits to the extent that the review can become a reference for constructing a critical collegiality (Lather, 1999, p. 4). A reflection on the state of the art may provide a basis from which new theories and methodologies can spring in terms of the development of a transdisciplinary science more adequate to contemporary complexities. It is marking the landscape for new excavations.

**Disciplinary review**

In general, disciplinary reviews are processes and products that serve as an assessment and linking of already published work to (re)define a given knowledge domain. Such domains are constructed according to social and epistemological commitments and conventions of the discourse community in which such a review is situated. Moreover, it is political as the terms of the material conditions underlying research and practice, its social utility, and the power relations out of which it is produced are framed in a political context. Knowledge thus produced is a form of cultural capital (Apple, 1995). The kinds of knowledge that are recognized as legitimate or of high status enable universities to use this recognition as a form of social capital (Apple, 1999, p. 344). Knowledge is a form of power. It operates as a regulative mechanism, which is expressed by the meaning of discipline. Bourdieu (1993) notes that people and institutions exist in determinate and overlapping fields of power.

Thus, markets over capital exist in structured ways, in contexts. For particular kinds of knowledge to be a valued form of capital, the knowledge itself must be recognized both within that field of power as important and in the connections between that specific field and more powerful fields as high status as well. (Apple, 1999, p. 344)

Knowledge is a covert and implicit form of power and it operates through discourses (Foucault, 1979, pp. 3-31). Popkewitz (1991) argues that such power

is embodied in the ways that individuals construct boundaries for themselves, define categories of good/bad, and envision possibilities. Power, in this latter sense, is intricately bound to the rules, standards, and styles of reasoning by which individuals speak, think, and act in producing their everyday world. (p. 223)

The traditional form of power, adhering to organs of the state, is explicit. Knowledge as a form of power is embedded in the language of a discourse. Discourse, according to Foucault (1969/1972), is a system consisting of rules of formation and volitions that control what can be said within a particular field. Such a straightforward view on disciplinary knowledge and its status in the form of social capital is for several reasons more
difficult to capture when dealing with the transdisciplinary field of simulation and gaming.

Transdisciplinary review

In the transdisciplinary field of simulation and gaming the discourse is not similar to the one used within one particular monodiscipline. One reason is that which constitutes knowledge and social capital is less straightforward. By crossing knowledge domains, simulations and games link multiple and often incompatible realities into one framework. That framework in itself (i.e., the apparatus or tool) encompasses various forms of knowledge. Two kinds of knowledge play an important part in simulation and game design, that is, declarative and procedural knowledge. Declarative knowledge refers to facts, concepts, principles, and laws. It is knowing that. Procedural knowledge concerns procedures and strategies. It is knowing how. In addition, in a gaming context players interact and shape local tacit knowledge. Sternberg, Wagner, Williams, and Horvath (1995) mention that procedural tacit knowledge involves knowing how the system functions in which one is operating. As a matter of convenience, I will further pay attention to simulations in which actors are involved, excluding pure computer simulations from the discussion.

Simulation and gaming produce interactive learning environments. They aim at developing expertise. Six interacting key elements of such learning environments are metacognitive skills, learning skills, thinking skills, knowledge and motivation (Sternberg, 1998), and competence of acting. Metacognitive skills refer to people’s cognition of their cognition, which is their understanding and control of their own cognition. Therefore, metacognition is a second-order concept. It refers to itself. Sternberg mentions seven modifiable metacognitive skills: problem recognition, problem definition, problem representation, strategy formulation, resource allocation, monitoring of problem solving, and evaluation of problem solving.

Examples of learning skills are selective encoding, distinguishing relevant from irrelevant information, selective combination, putting together the right information, selective comparison, and relating new information to information stored in memory (Sternberg, 1985).

Thinking skills are as follows:

- critical (analytical) thinking (i.e., analyzing, critiquing, judging, evaluating, comparing, and contrasting);
- creative thinking skills (i.e., creating, discovering, inventing, imagining, supposing, and hypothesizing); and
- practical thinking skills (i.e., applying, using, utilizing, and practicing) (Sternberg, 1997).

Designing interactive learning environments that embed such a variety of knowledge and skills puts the designer in a powerful position by constructing boundaries for the participants. Often the designer implicitly defines categories of good and bad and envisions and offers possibilities of action. The game developer’s power is intricately
expressed via the rules of the game. By defining the decision space and the possible interactions, the designer influences the styles of reasoning by which individuals speak, think, and act in producing their gamed or simulated world. The paradox, however, is that by giving the participants a voice in knowledge production, the designer and later the game operator/facilitator are not the owners of the knowledge generated during a simulation or game. The participants become the co-owners of that knowledge. What a simulation and/or game produce is to a large extent their social capital. For a university or research institute this form of social capital does not count as recognizable currency in the knowledge market. It cannot be converted at a high enough price into other forms of social and economic capital so needed by universities in times of economic crisis in higher education. To paraphrase Apple (1999, p. 345), the designer (facilitator) may thus put the institution at risk by engaging in “low status” activity with little capacity for conversion. No matter how important to the field of simulation and gaming, the social field of power in which academic institutions operate provides a context in which critical syntheses (as in simulations and games) are hardly recognized as being a form of cultural capital. This applies especially in a context that favors a narrowly technical rationality.

This is particularly disappointing when a particular simulation/game addresses questions at the science/policy interface and the participants are decision makers. Those decision makers may subsequently use the knowledge gained during such a simulation/game session to exercise overt and explicit power through the institutions of the state or the company. Designers are not in the position to claim “the intellectual property rights” of a simulation or game session in ways similar to producers of disciplinary knowledge. They can claim ownership of the apparatus, but in the end, that plays a minor role in the struggle to acquire social and cultural capital. At last, they play the role of intermediator among disciplinary knowledge domains and between science and the field of practitioners such as policy makers. The popular view is that “it is not the truck that is important, but the goods that are delivered by the truck.” University departments of methods and techniques in social sciences face similar problems. This makes a transdisciplinary review on simulation and gaming less tangible than a disciplinary review. From the viewpoint of social capital, the following key question needs to be addressed. Are games and/or simulations liabilities and/or assets in the struggle for social/cultural power?

Against this background it is interesting to see how the authors deal with the design and use of simulations and games. Within the framework of Table 1, they place themselves in different locations. They draw their knowledge and experience from different and common domains, cope with different and common types of puzzles, and report about different types of social capital.

In his article “Ecology of International Business Simulation Games,” Hans B. Thorelli (2001 [this issue]) reviews the history of a classical management game that he and his colleagues developed since the early 1960s. By focusing on INTOPIA, he stresses a diachronic review of one general simulation game, which can be considered a benchmarking study on the whole field of general management and business simulation games. A review of the whole field of management games is out of the scope of
this special issue. Explicit design principles, assumptions included, and the source listing of the computer program are preconditions for such a synchronous assessment. In many cases, that information is not available. Therefore, I have chosen a narrative approach that enlightens practical matters of game development based on experiences with one game. This bottom up approach from the designer’s perspective illustrates how gaming works and what you can do with it; how games can be molded, modified, and adapted. Game developers have to accommodate themselves to a changing world. Thorelli speaks about his brainchild from its initial steps to a mature product. He does not present and discuss evaluation studies with the game. It is interesting to notice the impact of advances in computer hard- and software on the instrumentality of the business simulation game and the pragmatics of simulation sessions. Key concepts are integration of the functional areas of business and the interaction among structure, strategy, and performance. The open systems approach is central to this article.

In their article “Simulation/Gaming and the Acquisition of Communicative Competence in Another Language,” Amparo García-Carbonell, Beverly Rising, Begoña Montero, and Frances Watts (2001 [this issue]) review research in the field of second or foreign language acquisition. They focus mainly on a synchronic perspective and discuss advantages of various types of simulations and games. Through experimenting with several types of games, they present remarkable results. In their approach, they pay attention to simulations as vehicles for communication and interaction. Within the context of their article, they disregard the specific content of the games they used. The distinction between computer-assisted and computer-based simulations enables them to use different interactive learning environments that are more or less rule driven. Computer-based simulations have a structure familiar to the design of INTOPIA. The International Communication and Negotiation Simulations Project (ICONS) is an example of a computer-assisted simulation.

Dennis L. Meadows (2001 [this issue]) discusses in his article “Tools for Understanding the Limits to Growth: Comparing a Simulation and a Game” the history of three decades of global modeling by comparing lessons learned from the computer simulation WORLD3 and the computer-supported game STRATEGEM. Although Thorelli speaks about ecology and environment, he uses those terms metaphorically. Meadows’s article is really about global environmental issues. Both the simulation and the game reflect a systemic approach to the complex interrelationships between population, capital, agriculture, nonrenewable resources, and persistent pollution. Here again the designer, who knows all the ins and outs of his brainchild, has the floor. Consequently, the review is mainly diachronic. It is a benchmark on integrated environmental modeling and education, showing in its use the impact of evolving information technology on the two learning environments.

Arnaldo Cecchini and Paola Rizzi (2001 [this issue]) reflect on four decades of urban gaming simulation in their article “Is Urban Gaming Simulation Useful?” They address similar questions of integrated modeling and gaming as Thorelli and Meadows, and link their scientific views to evolving conceptions about governance and social planning of cities. They identify a coevolution of the shifting power of simulation and gaming with the changing social order and the shifting attitudes toward
social planning. Scientific approaches underlying simulation and gaming and political attitudes can strengthen one another. Political attitudes can also cancel out the use of simulation and gaming. Accordingly, Cecchini and Rizzi characterize a crisis in urban simulation and gaming.

Brigid A. Starkey and Elizabeth L. Blake (2001 [this issue]) review 50 years of “Simulation in International Relations Education.” They focus on the educational applications of simulations in international relations and trace the history of international relations simulations by examining ICONS at the University of Maryland. They present a synchronic and a diachronic view on their field of inquiry. Like Thorelli, Meadows, and Cecchini and Rizzi, they pay attention to the impact of information technologies on facilitating and delivering simulations. They look into the future by mentioning how computer-assisted simulations have anticipated trends in the real world of diplomacy and what simulations must do to accurately reflect real world trends. The shift from physical to virtual presence in the world of diplomacy may indicate an emerging property of globally interacting systems. It may raise the awareness of the potentials of gaming and simulation in this regard and increase its cultural capital. By presenting an international scope similar to Meadows’s global perspective, improving competence in governance is one of their objectives.

The sequence of the articles may mirror a linear image. This is not correct. They form a network of theories, tools, and applications. For example, Thorelli’s article and Starkey and Blake’s article present the type of learning environments used by García-Carbonell et al. to teach second language acquisition. Most articles discuss the way information technology affects their work.

García-Carbonell et al. show the potentials of simulation and gaming to enhance communicative language acquisition. It is a story about gaining knowledge and skills to speak a second language and its impact on the educational discourse. They deal with communicative competence as such, taking into account the subject matter that is relevant for their students. By using computer-assisted and computer-based simulations, they rely on types of interactive learning environments, as presented by the other articles. The other articles address knowledge embedded in the transdisciplinary language of systems models. Users of their simulations and games are students and practitioners, that is, decision makers in the private and public sectors of society. As such, they deal with the intricacies of the science/practitioners’ interface and the decreasing span of attention of decision makers. The evolving policy context will influence the further design and use of integrated simulations and games to the extent that Meadows, Cecchini, and Rizzi present the idea of a family of games centered around a specific theme. Time constraints and advanced technology will define which simulation/game will be used in practical circumstances. Starkey and Blake address the potentials of the Internet to broaden the reach of games and simulations. It is obvious that information and communications technology form both a barrier and accelerator to applications of simulation and gaming. Meadows and Thorelli are originators of well-known products that have a history of three and four decades. They have experienced several scientific and political cycles, in combination with fast advances in information technology.
García-Carbonell et al. argue convincingly that theory development in communicative competence moves consistently into the direction of simulation and gaming, which enable the linking of several types of competence with cognitive and affective skills. They have a strong point in declassrooming the classroom.

The five authors are in the vanguard of this reflection on the state of the art and science in simulation and gaming. They cover the following fields of Table 1. Thorelli emphasizes instrumental design (tool development) (I) and training and education (IV) about business (1) and management (e). His article is characterized by the array {I,IV,1,e}. García-Carbonell et al. focus on {III,IV,3,c}. Meadows pays attention to {I,II,IV,2,6,10,12,a,g}, and Cecchini and Rizzi refer to {IV,13,e,g}. Starkey and Blake emphasize {II,IV,8,d,g}. This assessment implies that many fields are not yet represented. Once the overall field, depicted by Table 1, has been covered to a fair extent, we can start making inferences about major puzzles the field of simulation and gaming is facing. In the end, I hope we will better be able to frame a coherent game theory covering the various social and human realms to revise beliefs about how games work and to modify games themselves.

The authors, while covering the state of the art and science in their particular fields, have presented their cultural and social capital gained over many years of inquiry and practice. How can we build on their accomplishments? Thorelli mentions that a behavioral theory of the firm is needed. Guetzkow regrets the “lack of development of a Big Social Science” (see Note 2 in Starkey and Blake’s article). I add to this that a coherent game theory is needed and speculative conjectures couched in terms of such a theory. It is evident that such a theory is transdisciplinary in nature. In recent articles I have initiated development of such a theory (Klabbers, 1999, 2000a, 2000b, 2000c). Similar to the institutionalization of research in physics, chemistry, and genetics, the field of gaming needs institutional backing, a long-term research policy, and related funding. This is not an activity of one singular scholar or university department. What I have in mind is a concerted action of many scholars and professionals under the auspices of something like a Santa Fe Institute. As is shown in Table 1, gaming needs a transdisciplinary, transcultural setting to be productive. The combined intent conveyed through the articles points in that direction.

References


Jan H. G. Klabbers has been founder and leader of the Social Systems Research Group at Nijmegen University; professor of futures research at Leyden University; professor of adult education, community development, and gamma-informatics at Utrecht University; and professor of public administration at Erasmus University Rotterdam. He is currently managing director of KMPC, a management and policy consultancy, and full professor in the Department of Information Science, University of Bergen, Norway. He has published on systems theory, methodology, and applications of gaming and simulation. He is general secretary and former president of the International Simulation and Gaming Association (ISAGA).

ADDRESS: JHGK: KMPC, Oostervelden 59, 6681 WR Bemmel, the Netherlands; telephone: +31 481 462455; fax: +31 481 461828; e-mail: jklabbers@kmpc.nl and jan.klabbers.ifi.uib.no.