Ludic Culture and Simulation Gaming in Teaching the Principles of Sustainable Economics

Michael Kryukov, Lomonosov Moscow State University, Russia
Tatiana Suprun, Lomonosov Moscow State University, Russia

Abstract
Images play an essential role in the composition of knowledge, activity and thinking; any professional occupation needs proper understanding of reality, which means the ability to construct its image. Simulation (or business) games are a valuable source of imagery assisting in the formation of conceptual language of social and economic knowledge in general and environmental economics in particular, and the potential of this source is far from being exhausted. It rests on the ludic culture, which is genetically related to the festive (carnival) folk culture of the Middle Ages and Renaissance. Being a category of consciousness, images have profound influence on people's opinions and attitudes and they may be useful when it is necessary to attempt to inculcate the sense of ecological responsibility in the students of economics. The Paper identifies the features of festive activities that constitute the deep foundations for the ludic culture and hence for the simulation game. It also discusses methods and principles of the games that can be used in an academic course on environmental economics.

Introduction

The human dimension has always had its place in economic matters but there have been periods when this place was very far from the centre. Empirical research, which for centuries used to be the content of natural sciences, came to be seen as the most valuable element in what we traditionally call Humanities. In economic matters, with the advent of behavioral economics there was a shift of focus towards what individuals actually do, and numerical data have been obtained, showing that the theory of rational expectations cannot be universally applied. The definition given to the science of economics by Lionel Robinson that emphasized human behavior as its subject matter is regaining its popularity, but, thanks to the most impressive works of David Cahneman and his colleagues, most attention has so far been given to research into process of making choices.

The understanding of how people make their choices is certainly important, particularly for such areas of economic life as consumer and stock markets. It is probably a valuable part of the so called human skills that include negotiating abilities for all kinds of situations. At the same time there is a feeling that this shift of attention has reinforced the decrease in the awareness of the more material aspect of economic activity, the decrease caused by contagious enthusiasm for dealing with financial resources, in some degree neglecting other scarce means and their alternative uses.

This neglect may lead to most undesirable consequences, hence the obvious relevance of simulation games, which can help students in gaining proper understanding of reality, instill in them, without preaching, the right attitudes to various aspects of production and management for sustainable economy and in an integrated way improve their analytical, decision making and interpersonal skills.

We regard the simulation gaming as a manifestation of the more general phenomenon of game, which is not only one of the fundamental intrinsic properties of the human being, but also a model of human behavior. Theoretical and historical understanding of this phenomenon, of its genetic code, is important for better application of ecological economic games in an academic course on environmental economics.

The literature on the subject seems to fall into three main categories, whose borders may be somewhat blurred but the emphases are always clear. The first category can be called apologetic. Seeking to promote simulation games for educational purposes, the authors such as Mark.C. Carnes (2014), Moizer, Lean, Towler and Abbey (2009), Corwin, Danielson, Ragusa and Tierney (2016) examine the impact of games on student outcomes and explain its causes and implications, which serve as arguments in favour of more extensive use of this tool of teaching and learning. Another category can be called descriptive or game design, as it includes papers that offer detailed descriptions of materials, tasks and rules of particular games, like the classical *Stratagem* designed by Dennis Meadows (1973) and The Commons Game by Richard Powers (1982). Papers of the third, and the most "scientific", type look into cognitive, motivational and psychometric issues and offer suggestions for designing games based on the results of their research. One of the latest collections of such papers is *Using Games and Simulations for Teaching and Assessment*, edited by Harold. F O'Neil, Eva L. Baker and Ray S. Perez (2016).

Theoretical basis behind play and gaming is very extensive and careful examination should begin with Plato or even earlier authors. The greatest authority on play and games is probably still J. Huizinga's *Homo Ludens* (1949). The famous *The Glass Beads Game* by Herman Hesse is hardly scientific, but it gives abundant food for thought to those interested in the phenomenon of the game. The present paper seeks to look at games from historical and cultural perspective, introducing the reader to the works by the Russian author M. Bakhtin and to the experience of using games in the process of teaching environmental economics to undergraduate students.

Images in the composition of knowledge

Visual images have not been very popular with scientists. In a similar way many teachers of economic disciplines, frown upon the use of images in lectures regarding them as something not rigorous enough for the high lore they seek to convey. Meanwhile, Einstein is known to have asserted that he was "thinking by means of visual images and even muscular sensations" . As it was once noted by the author of the book with the characteristic title *"Visual Image in the Structure of Knowledge"* (Slavin, 1971), physics explores not the mathematical structures, but the physical reality with the help of mathematics. Consequently, however high the level of abstraction attained by the scientific thinking might be, the latter is always drawn to the sensual visibility, to imagery, which links our theories to the material objects and relationships between them. It is essential here to have the opportunity to create from dissimilar elements an image that will correctly reproduce the object's structure. This opportunity is significant far beyond the scope of physics as the resulting image (image model) is primarily intended as a field for the thought experiment, for the "playing out" of the situation, in which other sciences may also feel the need.

The prominent Russian psychologist V. Zintchenko (1987) specified the value of the image for professional activities pointing out that any professional occupation suggests proper understanding of the situation, which means the ability to construct its image. This, in turn, includes the assessment of its dimensions in both qualitative and quantitative terms; ability to devise an expedient programme of action for this particular situation; and finally, execution, i.e. the action itself. He believed in the necessity to make education more humanitarian, to enhance its imaginative element: "Right are those scientists who say that any particular science must also be part of the Humanities. Why? Because it is the Humanities that teach the methods of how to treat the unrepeatable, the unique; they teach not only to perceive and register, but to build an image of the phenomenon, to penetrate its structure, seek its meaning – and refrain from premature labeling" [12, p. 56].

One of the aims of higher education is the nurturing of creative thinking. Mechanisms of creative activity in all spheres possess some common ground and the ability to think creatively can be acquired not only in the domain of arts or humanities. It is possible to develop this ability on any material, but using the methods of humanities. A *conditio sine qua non* of successful outcome is the formation of the visual intellect or thinking through images. It is time this type of thinking were treated as an indispensable instrument of cognition and practical action, rather than something that normally belongs to painters or writers of fiction and only through happy chance had found its way into Einstein's brain.

Ludic culture in simulation gaming

It must be noted, however, that thinking through images is rarely the same as visual thinking. The latter is probably the case in engineering. But for the economic science, for the research in management, as well as for other disciplines that study complex interrelationships of both individuals and social groups, visual thinking could hardly be appropriate. The "image languages" of economic and social sciences are to be more sophisticated. Although the visual images are certainly not ruled out, we are in greater need of images of a "hybrid", or synthetic nature. Their mission is to reflect the dialogical processes. The imagery of art, and primarily that of the theatre, can serve as an example. In theatre, however, there is a division into active participants and spectators, which does not suit the image model since we proceed from its role in the structure of knowledge and professional activity: one must be able to build the image and work with it as its creator. In this situation a detached spectator rather seems to be out of place. The creator and spectator here are one and the same entity.

As we have noted, the image model serves as a field for thought experiment. While studying a complex social system it may be difficult to keep in mind all components of its model, hence the idea to make it external in relation to consciousness, thus turning the thought experiment into simulation experiment and the mental "play-out" into the simulation or business game.

This type of games typically involves a complex set of factors: teams of participants, packages of materials, sophisticated rules and no less sophisticated procedures of conducting the game. For a genuine image model to come into being, this multiplicity must become a harmonious unity and generate the specific field of the game. We expect participants not only to be interested, but experience a genuine rise in spirit, something of the kind that can still be felt when we read the transcripts of one of the first Soviet business games, "The Red Weaver", designed and conducted under the guidance of M. Birnstein (Birnstein, 1978).

What stimuli can be thus elevating for the spirit? How does this unity appear? What content is it supposed to convey? Our answer to the first question might be as follows: the stimulus is the game itself and the habit of playing as a component of culture is deeply rooted in consciousness. The game thus becomes a mechanism that assists in the creative process, which is essentially the same for all types of human activity. Our ludic culture, like many other cultural layers, incorporates elements from various spheres. Yet, we think it reasonable to select those which, taken together, can be called all-European ludic culture. In its origins it is close to the festive folk culture, which had been brilliantly analyzed by Michael M. Bakhtin in his book *Rabelais and Folk Culture of the Middle Ages and Renaissance* (1965). Building on this work we attempt to identify those features of the festive folk culture, in which we find encrypted the essential qualities of the modern simulation game.

Firstly, the game was a phenomenon, related to time and space as universal categories of being. No wonder the main instruments of the game – cards and dice – serve as the basic tools of fortune-telling, i.e. finding out about the future. The universal and philosophical character of the game images was vividly perceived in their relation to the time and the future, the Fate and the state power. That was the way to understand the chess pieces, dice, figures and suits of cards. It is worth remembering that chess

formed the basis of the war game, which is effectively the first specially designed imitation with strict rules. So the second feature of the game was that participants played out its content translated into the language of symbols.

The third, and crucial, feature concerns the distinction between life as such and life in the game. In games people acted out in miniature the totality of their lives and they acted without ramps separating performers from spectators. At the same time the game placed them outside the tracks of ordinary life, liberated them from laws and rules of that life; instead of everyday conventionality it gave them a different one, more compact, more joyous and lightened. This applies not only to cards, dice and chess, but also to other games, including sports games (e.g. ball and bowling) and children's games. The very core of the carnival culture lies at the boundaries of art and life; it is life itself – organized in a special, ludic, way. That is why one is not watching the carnival in contemplation; one is living in it.

The fourth characteristic is determined by the first three. The miniature model of life allows the players much more freedom despite the strict rules and this gives them that feeling of ease and lightness, which has always been an essential quality of the game. There is, however, at least one more quality that contemporary games share with the ancient folk ones. The point is that festivities (of any kind) are an essential primary form of human culture. Their existence is not caused or determined, it is neither explainable by practical conditions or public labour objectives, let alone by biological (physiological) need for regular rest from work. Festivities have always had profound contemplative and cognitive significance. No "exercise" in the organization and improvement of public labour process, no "playing work" as such can ever become festive. To become festive, they must incorporate something from a different, spiritual and ideological, sphere of being. *They need to be given sanction from the world of the highest goals of human existence, the world of ideals, rather than from the area of means and necessary conditions.* No festivity is possible without that. [1, p.17]. Participants of a simulation game experience enthusiasm, which is akin to the festivity of the folk culture. It is fuelled by the opportunity to, at least temporarily, break away from the mundane pragmatism and join the world of different, if not higher, values. (It is no coincidence that the subject area, best corresponding to the game form of content presentation, is ecology.)

Creativity and overcoming

There is a phenomenon, which is inherent in diverse manifestations of creativity. M.M. Bakhtin called it overcoming the material. Thus, literary works are characterized by overcoming the language. "However, overcoming the language as overcoming physical substance is absolutely immanent; the substance is overcome not through denial, but through immanent refinement in a certain, necessary direction… One should understand the immanent logic of creation, rather than its technical instruments, and, first of all, it is essential to grasp the system of values and meanings, i.e. the framework, in which creativity exists and contemplates itself in terms of values, to understand the context in which the creative act is thought and interpreted"[2, p. 168].

For any game, the simulation or business game included, the material to be overcome is rules of the game that restrict the player's activity, in a way similar to that in which

language imposes limitations upon a writer and marble – upon a sculptor. The ability to overcome limitations can be seen as a legacy of the folk festive culture. People of the European Renaissance understood games and also theorized about them. The German philosopher, theologian, jurist and astronomer Nicholas of Cusa (1401-1464) in his work *De Ludo Globi* (Game of Ball, 1463) wrote : 'I believe that no decent game is altogether lacking in [symbolic] learning'. The first conscious attempts to use this quality of games were probably connected with warfare, which is not really surprising, as in this sphere a lot depends on the subjective or behavioral factors. In the opinion of Carl von Clausevitz (1832), one of the most famous (in Europe) military theorists, 'absolute, so-called mathematical, factors never find a firm basis in military calculations. From the very start there is an interplay of possibilities, probabilities, good luck and bad, which weaves its way throughout the length and breadth of the tapestry. In the whole range of human activities war most closely resembles a game of cards'.

To understand the content aspect of the festive culture and, by the genetic linkage, of the game simulation, it is important to remember the idea of M.M Bakhtin who argued that it is impossible to reduce a feast to a particular limited content (e.g. to a celebrated historical event) as it goes beyond any content limitations [1, p.289]. The same occurs in a simulation game. If we manage to keep it within the predefined content we effectively kill the game by turning it into training. The benefit of this execution is questionable. It is getting beyond boundaries where the pedagogical and generally cognitive significance of game simulation is to be found, in which the creative character of the game reveals itself. However, we can conceive of a content so extensive, that it will be impossible to go beyond its boundaries. This challenge is met by the very nature of festive images, in which freedom is not so much an external right, as the intrinsic content. [1, c.289]. We can say that the content immanent to simulation game is freedom as a factor of behavior in socioeconomic systems.

 All these features are present in contemporary simulation game, making it an effective tool of learning, particularly in those spheres where images and opportunities to play out various combinations of components are essential for successful outcome.

Simulation game in university classroom

So far have talked mostly about the 'genetic roots' of the simulation game and went quite far back in time. Now let's return to the present-day practice. What is a game in today's university classroom? The answer comprises its three major aspects: it is a model, a system and, certainly, a game.

The simulation is a model of the system that is being studied, researched or managed. It belongs to the processual type as it reflects the economy where resources can be used only if they appeared as a result of previously initiated processes (or the previous entering of data). This is where simulation game differs from the statistical balance sheet model (the latter does not prohibit the use of resources that have not been produced yet). The components of the model comprise data, participants and response mechanism (formal algorithms or experts). It is important that the game must not be overloaded with data and/or contain information of minor importance, hence the need for the strictest selection of the material.

It has been noted, that the creation of the right imagery is equivalent to proper understanding of the situation, not only in the game, but also beyond its borders. The simulation game is a special self-contained world that exists and develops according to its own laws. Being a model, however, it relates to reality beyond its borders as an analogue to the original. But this relationship is reversible in principle: the elements may change their causal status, depending on the point of view, which allows us to regard the game as the original or generating model for the non-gaming reality. Once reality has been thoroughly understood, the game image becomes the starting point for constructing other real situations. In this way, the game image can generate non-game reality, not only in theory but also in practice.

As a system, simulation game consists of several subsystems:

- decision-making subsystem;
- response subsystem;
- information reporting system;
- subsystem of collection, storage and analysis of information about the progress of the game.

Participants are assigned certain roles and they take relevant decisions; the environment responds to these decisions; in new conditions new decisions have to be made. This happens according to the rules that outline reality as if by a dotted line. Then the players' imagination joins in, creating a model of the processes that constitute the game, the resulting whole being determined by the personalities of participants who, in an immanent way, are overcoming the rules.

The ontological qualities of the game make it particularly suitable for teaching environmental economics. Play and games as such do not quite belong to the straightforwardly pragmatic world studied by economics where maximizing one's profit is an overriding objective. Researchers agree with what at different times was most conclusively expressed by Mikhail Bakhtin and Johan Huizinga: that games, since they are not necessary for biological survival, are driven by a different kind of motivation. To be able to play, the participants have to be fundamentally disinterested, the genuine game is not played for earning food, clothes and shelter (even though one sometimes can get a few bucks in a game of poker), while the playing people find themselves on a special territory where they become to a significant extent liberated from their usual needs and wants and enter the world of other, less pragmatic, values.

Environmental aspect of human activity as well as environmental part of the economic science seems to be of a kindred spirit. Concerns about nature, soils and water, plants and animals do not normally contribute to increases in wealth. On the contrary, they are likely, with few exceptions, to lead to higher costs, lower profits, a lot more effort and less outcome in terms of immediately tradable goods or services. The life of future generations and sustainable character of economic systems do not receive serious attention from those scholars who are in favour of sustained, instead of sustainable, growth, the concept of reproduction is not even mentioned in some of the most popular manuals on economics (Begg, Fisher, Dornbush, 1991, Mankiw, 1992, Mulhearn, Vane, 2012). The department of environmental economics at the Economics faculty of Moscow State University is the only one that remains in Russia, while in former times almost every educational establishment involved in teaching economic disciplines had a division specializing in this area.

The Game *at the Lake*

We include simulation, or business, games in our curriculum because they help study the system 'economy-people-nature' and create plausible scenarios with a view to achieving sustainable growth. One example of a simple but profound simulation is the game "*At the Lake*". It was created by Vladimir Komarov (1998) along the lines similar to those of the Commons Game (Powers, 1982) which is considered classics of the genre and which generated many emulations and modifications. Both games deal with the issue of how to achieve an agreed optimum while exploiting a commonly used renewable resource.

The game "At the Lake" models an ecological-economic system and decision-making in such system. Besides, it has profound social and psychological meaning and can be regarded as a metaphor for a lot of situations that require concerted action by a group of people.

Six to eight people participate in the game. Each of them has the role of director of a firm, which uses the resource that is common to all the firms, in this case it's the water from the Lake. The players can sit around one table or at the tables in a row (two at a table), but each director is to take decisions on his own, in secret from the others. Cards of five colours signify decisions: red stands for discharge of the used water, which means greater profit but worsened state of the lake, green means reclamation (purification) of the used water, which reduces profit but does not change the state of the lake. Purple and blue cards signify the so called public decisions: the former means imposition of fines, the latter – rewards to those who purify the water. The yellow colour signals switching to a production that does not require water. There are 40 to 60 periods equivalent to months. Every 12 months there happens self-clarification of the water caused by a snowmelt flood. Every 8 months players are allowed to hold a meeting where they can design a common strategy.

A special 'imitator' table is used to register the consequences of decisions so that all the players could see how easy it is to turn the clean water into dirty. Yet, the lure of quick gains proves to be irresistible for the overwhelming majority who lay out red cards without giving to it any serious thinking. Only when the lake has been noticeably polluted and profits begin to decrease steadily, there appears at least one public inspector. Instead of striving to win in profits he prefers to lay out purple cards, that is, to impose penalties.

There is an interesting regularity. At the meetings where the players communicate, they all usually agree to purify the water (lay out green cards). However, some of them immediately break the agreement and continue to gain by discharging dirty water, at the expense of the environment. In subsequent periods decisions become more realistic, but agreements still get broken, which gives a dramatic character to the process of communication between the participants.

The game clearly shows at least two key concepts of the environmental economics. The first is the notion of assimilation potential, which is modeled by the possibility to take several (not more than eight) decisions to make polluted water discharges without reductions in profits. Secondly, the game reflects the market failures connected with deficient property rights to the natural resource.

Another interesting regularity concerns the players' behavior. The author of the game, V. Komarov, suggested a classification of behavior patterns in the form of mildly humorous descriptions. There are four main types:

• *Lucky Selfish* – plays to win at all costs, discharges dirty water more often than others, but, thanks to his intuition and observation abilities, avoids penalties, promptly replacing 'red' decisions with 'green' or 'yellow' ones.

• *Loser Selfish* – also plays to win, as unscrupulously as the first, but owing to a lack in understanding and flexibility keeps getting fined and makes losses.

• *Passive community-minded (public-spirited)* – most of the time uses ecologically clean technology; in the course of the game his primary struggle is with himself, to resist the temptation to make a water discharge. However, he/she does not try to do anything about the other, selfish, participants.

• *Active community-minded* – prefers to impose fines on the selfish and, less frequently, rewards the passive community-minded.

With these characteristics it is possible to interpret results, give accurate assessment to players' performance and make them think about the moral side of winning and losing in this game. It becomes particularly exciting after the second period, when small teams (2-3 people) of participants are to work out a project of a system that would allow them to get higher profits and at the same time keep the water clean. Then the teams analyse each other's projects and draw a realistic common one, optimum in economic and ecological terms.

Here we come across yet another regularity. The most unrealistic projects, exclusively based on conscientiousness of participants without any support of the law enforcement kind, are suggested by the lucky and, even more often, by the unlucky selfish. They seem to be creating conditions for future unpunished predatory exploitation of resources, without being fully aware of what they are in fact doing. When other players catch them doing this, they tend to be surprised and embarrassed at such turn of events. The projects proposed by the passive community-minded are more complex but they are as far from reality as the first category. It is the active community-minded, who prove to be most sober and realistic.

It is also interesting to compare the performance of school children (senior teenagers) and students on the one hand – and that of students specializing in ecological studies and in economics-*cum*-management. The first group (children) took the game too seriously and soon began to play openly, overcoming the rules literally rather than immanently, which is formally allowed but the game in this case loses sense. The adult students enjoyed playing, continued to operate within the game and had better results: the more play, the better the outcome.

Students of economics in most cases succeeded in designing a system that met the set requirements while for the other group (ecology) the success rate was about 25%. This means that there has to be a dialogue not so much between specialists in ecology and economics, but a dialogue of respective consciousnesses inside one consciousness, whatever specialist it may be.

Another game, which is included into the curriculum of our faculty is the game called Stratagem, originally designed by Dennis L. Meadows in the mid 1980-s. The whole game takes about one and a half month, with two 90-minute classes a week. It is a macroeconomic game, modeling the socioeconomic reality of a country. The form of

the game means that students not only revise what they studied in theory, but they become emotionally involved, they live through the history of their country (to which they themselves give a name) in their attempts to reach sustainable development.

 Simulation games allow us to create a vision of an economic system as whole, be it a small community around a lake, or a big country with all the systems necessary for development. The effectiveness of this educational technique is rooted in the human psychology and goes back centuries and millennia. And the moral dimension is probably its most valuable quality.

References

Bakhtin M.M. (1965) *Rabelais and Folk Culture of the Middle Ages and Renaissance*

Bakhtin M.M.(1975) Voprosy Literatury I Estetiki. Moscow, Hudozhestvennaya Literatura.

Bredemeier M.E. The Commons Game by Richard Powers // Simulation &Games. 1982. #4. P.497-500.

Carnes M. Minds on Fire. How Role-Immersion Games Transform College.

Clausewitz, Carl von (1832) On War. Princeton University Press, 1989.

Komarov V. F.(1998), Upravlencheskye Imitatsionnye Igry. Novosibirsk, Nauka

Nicholas of Cusa (1463). De Ludo Globi. In Metaphysical Speculations. Volume Two.

Kuzansky Nikolai. Sotchineniya v dvuh tomah. T.2, M. 1980. (Nicholas of Cusa. Works in Two Volumes, V.2.

Slavin A.V. (1971) Naglyadny Obraz v Structure Poznaniya. (A Visual Image in the Sructure of Knowledge)

Simulation-Gaming in Education and Training. (1988) Ed. by Crookal D., Klabbers J., Coote A. Saunders D., Cecchini A., Piane A. Proceedings of the International Simulation and Gaming Association's. Pergamon Press

Using Games and Simulations for Teaching and Assessment. Key Issues. (2016) Ed.by O'Neil, Baker, Perez. Routledge.

Zintchenko V.P. Gumanitarizatsiya Podgotovki Inzhenerov/ Vestnik Vyscshey Shkoly, 1986, #10. Pp. 22-31.   (Introducing More Humanities into the Teaching of Engineers.)

Zintchenko V.P. Psichologiya – Perestoyke/ Vestnik Vyscshey Shkoly, 1987, #7. P. 50-58.

Rabelais F. Gargantua and Pantagruel. M. 1956.

Simulation-Gaming in Education and Training. Proceedings of the International Simulation and gaming Association's 18th International Conference. Pergamon Press. 1988.

Using Games and Simulations for Teaching and Assessment. Key Issues. Ed. by Harold F.O'Neil, Eva L.Baker, Ray S. Perez