EFFICIENCY OF USING URBAN SIMULATION IN TEACHING URBAN PLANNING

Pimenova E.B. (PNRPU), waitwels@mail.ru
Saveleva E.O. (PNRPU), ekaterina.starodubzeva@gmail.com

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1 Introduction

The city as an object of urban planning is a very complex and multi-component socio-spatial system. Taking into account full spectrum of elements composing an urban system implies such level of complexity and detailing which will never be achieved in practice. As a result, designers and urban planners are often forced to work with a simplified model of the city. All kinds of tools based on GIS and mathematical methods are gaining increasing popularity among foreign researchers in the field of urban planning. For example, a professor at University College London (University College London) M Bhatti in his book «Cities and Complexity» describes the various simulations based on such instruments as cellular automata and agent-based modeling, which provide the process of decision making in an interactive mode, i.e., observing an instant reaction of the virtual community on one or another project (Devisch, 2008).
However, that it seems to be an incredibly complex and "scientific" approach to planning in academic and professional environment, it is successfully used in entertaining industry for twenty-five years. SimCity (SimCity) - a computer game released in 1989 and marked the beginning of the genre of urban simulation. In SimCity player usually has no particular purpose, achievement of which the game ends. The player controls the city, serving as mayor. In players hands such tools as the construction of roads and communications, construction of the main public buildings (administration, schools, hospitals, etc.), as well as zoning tool. Zoning of the city - in the game is available three types of zones: residential, industrial and commercial - allows "mayor" to manage the development and construction of the city. Latest released version of the game based on the revolutionary mechanism simulation Glassbox, greatly enhanced the realism of virtual cities and the processes occurring in them. Since first version of the SimCity was released until now it is one of the most popular computer games and probably the SimCity introduced to the world of urban development more people than any textbook (Starr). But does it have an educational potential?

2 Training with urban simulation SimCity.

SimCity Developers originally considered the game as an opportunity to show how to "build" the perfect city, and betrayed the importance of its educational potential. Until now, the company producing the game consider educational institutions as one of the key audiences (Lobo, 2004). No other game has been used so widely in schools to familiarize themselves with the various elements of local government and raise awareness of the factors determining the decision of municipal authorities (we are talking about American schools). So not surprisingly appearance of free educational versions of the game, as well as various materials for teachers to use games in the classroom.
According to D. Lobo SimCity also contributes to the emergence of interest in geographic information systems among pupils and students. If you work with real GIS software packages, in the first place, it is often beyond the financial capacity of schools and universities, and secondly, is too laborious and time consuming, while using SimCity is available, and the ability to "play for educational purposes" was adopted with enthusiasm. At the end of this stage of examination it becomes clear that it's still a game designed primarily to entertainment purposes. Whatever it seems realistic, SimCity can not become a tool to solve real problems of the urban planner. To do this is much better suited specialized GIS packages such as ArcGIS.

The idea of using SimCity in university courses related to urban planning, can not be called a new (Adams, Haber, Minneri and Searle, Nilsson and Jacobson). Practical exercises using SimCity are often aimed at developing in younger students an understanding of how different systems interact with the city, including the economic, social and transport services, engineering, and others. Such understanding is necessary not only for the planning of the development of modern cities, but also for a more critical approach to evaluating the planning decisions taken in the past (Minneri and Searle).
In their article, Nilsson and Jacobson (.Nilsson, Jacobson, 2011, p. 36), make a review and pick out three main goals, which can be achieved using urban simulation in the educational process:
1. to develop in students a holistic understanding of methods of various city components interaction;
2. to develop skills in strategic planning and to ensure that students are aware that their decisions can have both immediate and long-term effects; 3. to develop in students more flexible, adaptive, critical thinking, decision-making required.
Study of P. Adams, associate professor and director of the Urban Studies, University of Texas, also has arguments in favor of using SimCity in the learning process. Adams setting was to conduct several experiments in the game. Results of the study was assessed by students essays and interviews. The course was voted the favorite project among the 48% of students, well ahead of the next eight projects.
It should be noted that in the literature frequently encountered arguments against the use of computer games, and in particular the urban simulation SimCity, in training. Some authors draw attention to the problems that arise when using SimCity in the educational process. For example, Lobo (Lobo, 2004) argues that, because "the city is not a toy", students get the wrong impression when using the games.

3 Experience of urban simulation programs PNRPU.

The article describes the results of the introduction of practical work using computer simulation in two training courses, which are taught at the Faculty of Civil Engineering PNRPU:
1. Planning and construction of settlements - the fourth year of specialty Discipline "Urban Construction and Management."
2. The theory of the spatial organization of the cities "TPOG" - the discipline of the first semester of the first year Master "Design of the urban environment."

3.1 SimCity in the course "Planning and construction of settlements".

For the course "Planning and construction of residential areas" was included practical training with urban environment simulator sim city. This program has allowed students to apply knowledge from the lectures on the example of the construction and development of various cities. Each student was offered his own version of the direction of development of the city, such as the city - business center, an industrial city, a cultural center, a city with a developed system of public transport, family city - with developed social infrastructure and leisure, etc. During realization of the task the students faced with the problems of a growing city, providing citizens infrastructure (such as housing, schools, shops, workplaces, public transport), environmental improvements, upgrading of dilapidated housing, construction of new roads. In addition to these problems, development of the city is influenced by the financial burden. During the game, student, on behalf of the mayor of the city, we have to decide what is best for the citizens in the moment, where to direct cash flow as adjusted taxes to give loans. To track how connected all the processes of urban life, and realize that if today to invest in the construction of the mall, tomorrow may not be enough for the construction of roads, ie forcing students to plan the city's budget and think through the stages of development.
Since the simulator allows us to develop the city to infinity, in the framework of the educational process has been put in the game for a period of 1 week, 1-2 hours a day. In reporting session it was necessary to state: the population, the problems encountered during the construction of city revenues

and expenditures on infrastructure elements, the state treasury, the satisfaction of residents, some important projects are constructed and whether the purpose of the job is reached.

According to the observations of students we can say that the use of the program is useful, because you can feel as a city manager and head of various departments into one.

In my opinion, the students begin to think that the city is a single organism, and all the services it should be organized and work harmoniously in solutions supporting each other, then the development of the city will be balanced. Individual work allows everyone to learn the program, reporting on the occupation at the report shows the independence of the work, whether the person is guided in the program, whether it uses the terms. Making work in a presentation allows you to organize the results to assess the progress of their work, learn summarize the final moments. A report of the group to stimulate the development of the city as well as possible in order to adequately represent "his" city. Just in the course of the assignment is a dialogue within the group to solve the problems of the city, but there is no uniformity of decisions, because the goals are different. I believe that the use of simulation of the urban environment will enable students to face the challenges of urban life, which do not even think to trace the interaction of processes, the knowledge gained to work on the model.

3.2 SimCity in the course "Theory of the spatial organization of the city»: Urban Utopias TESTED and Evaluation of historical models of planning the ideal city.

Discipline "TPOG" is read in the first semester of Master's "Design of the urban environment", and aims to familiarize the Master with the conceptual framework of urban planning theory and practice. Since all the students coming from the magistracy, have different basic education from the Faculty of Geography and state and municipal government to architecture, this course aims to "align" their understanding of the fundamental laws of spatial development and planning, environmental functions of building, structure and evolution cities. Handout built chronologically from antiquity to postmodernism. Practical work is to construct a city in SimCity according to one of the six historical planning model of the ideal city:

• Garden City Howard;
• Radiant City by Le Corbusier;
• Broadacre Frank Lloyd Wright;
• Linear City Arturo Soria-e-Mata;
• The industrial city of Tony Garnier;
• Sotsgorod N. Milutin.

On the job will have one month, during which students independently (outside of class) build their chosen version of the utopian city in the simulator. Results of practical work were presented in two forms:

1. A written report (1000-1500 words), including:
• a brief description of the main features of the selected urban development model;
• description of the city, built in SimCity for selected model;
• conclusions on the feasibility and effectiveness of the selected urban development model based on observation and experience "construction" of the city in SimCity;
• assessing the suitability of SimCity for the "implementation" of the authors of original ideas of urban development models (which is easy to implement, and what game limits);
• bibliography.
2. The presentation, including:
• diagrams and drawings of the model chosen, a brief description;
• screenshots from the game, showing the layout of the city and the aligned illustrating the findings of the report (figure 1-3).

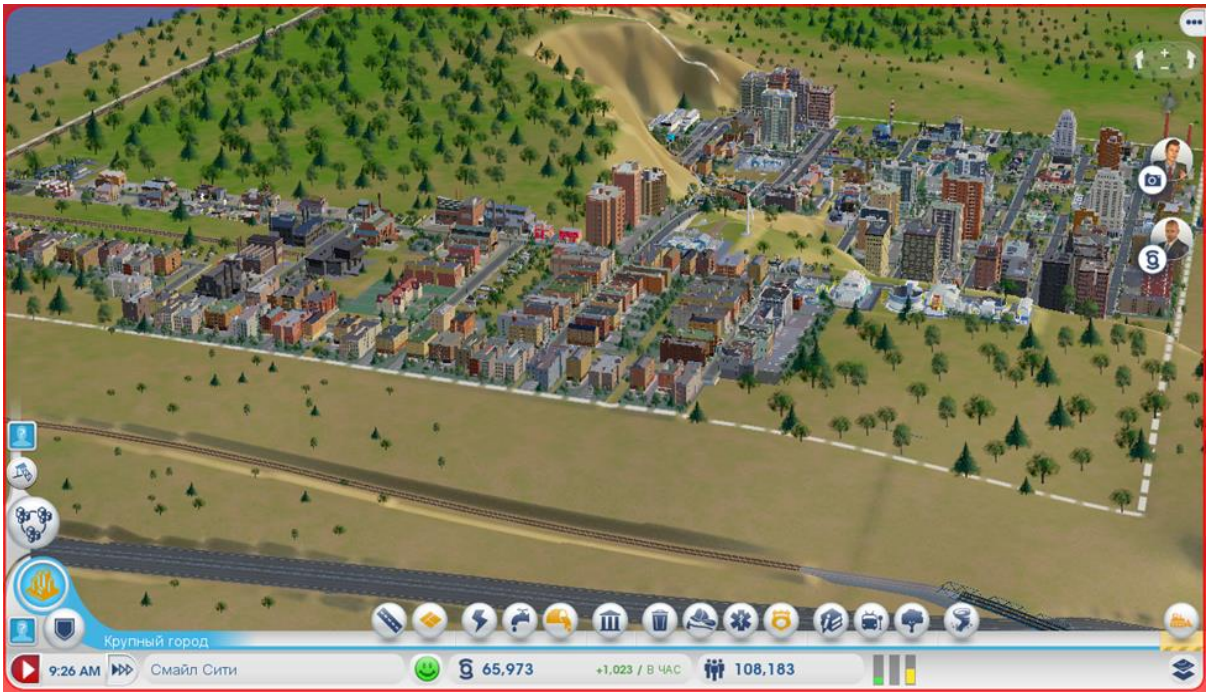

Figure 1. A city with a developed system of public transport

Figure 2. City budget

Figure 3. Population map

From the perspective of a deeper study of six urban development utopias project was an unqualified success. According to the task the students had to describe the basic ideas of the author of the selected planning model. Understanding that "the construction of" utopian city in the simulator requires a thorough comprehension of the original ideas of the author of the planning model led to more thorough approach to the analysis of these ideas, rather than with other forms of self-control work, for example in the preparation of the oral report.

4 Conclusions

Effectiveness of urban simulation in the educational process can be noted as follows:
1. Students gain new insights and skills in urban planning.
2. Students systematize the knowledge acquired in the lecture course, and past experience.
3. Students show skills of teamwork and mutual support.
4. Students with high interest are studies in the form of a game.

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