



DOI: 10.18427/iri-2016-0088

Teaching Strategic Management by Business Simulation Games

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A business simulation game is a practical way to teach economics for university students. This paper discusses why these simulations are useful in education and what positive learning outcomes they provide. A research was taken at the University of Pécs, Faculty of Business and Economics which compared three business simulations. The black-box and transparent-box theories are also compared. Other aspects as engagement and feedback are also discussed.

Introduction

When students learn theoretical subjects like business management, finance and marketing, there is a common issue which they face. They can read several books but it is hard to understand how to use the knowledge in practice. Schools make huge efforts to solve the problem, but there is still much to do. Business simulation games can help students to understand more deeply what they learn. This paper discusses the positive aspects of teaching business simulation games.

Terminology of business simulations

It has to be clarified what a business simulation is. There are several names of these games. Sometimes they are called business games, management flight simulator, learning environment, microworld, etc. In this paper I will not make difference between these names. I use business simulator and business game as synonyms, like the same way as for instance, Keys and Wolfe (1996), or Klein and Fleck (1990); in contrast Lane (1995), who distinguishes between simulation and game. I call business simulation a software which simulates a company, where groups of students have to make decisions. The company works on markets, where there are competitors - often other groups of students.

Many people draw an equation between simulation games and mini-games. Mini-games are much less complex than simulations; they don't

give the opportunity for the players to understand a situation deeply. Mini-games can be learned very fast, but they are not useful for education (Prensky, 2005). Examples for mini-games can be the default Windows games or the applications found Facebook nowadays. The main purpose of complex simulations is to learn complex problem solving.

Positive effects of business simulation games in the education

We can learn facts and skills. The traditional Central European education systems are mainly based on teaching facts. Nowadays these systems face a huge problem: facts can be searched for and found on the internet easily and knowing facts do not result in so much competitive edge like before. The US educational system is more based on teaching skills, which is more useful nowadays. Many economic universities in the USA use simulation games. From the 1990s simulation games have become more and more popular also at universities in Europe and computer games are very widespread nowadays in entertainment.

Several researchers evaluated the use of computer games in classrooms and found them useful in many areas. A report from *The Next-Generation Student* (2003) shows that students learn the best when they are engaged, need to think critically, solve problems, and make choices and decisions. Simulation can address these learning characteristics. Most of the simulation games used in education are made for purely education purposes, only few commercial games are used in classrooms. An UK research showed that in case of pure commercial games mostly economic simulations were used, like Simcity and Tycoon games. Simcity is a game where players have to build and manage a city. Tycoon games are usually stand for simulations of profit-orientated companies, like Transport Tycoon etc. These games are relevant to a large number of subject areas that make the simulation more cost effective and increase the possible chances of use (Kirriemuir & McFarlane, 2003). Bectra reported the use of other strategic games as well, which are rather like state simulators as Age of Empires, where the player has to manage an ancient empire (Dawes & Dumbleton, 2001). They reported similar research results as Kirriemuir et al., and they quote a teacher reporting SimCity 'worked well for all its learning outcomes'. These games are complex enough to be able to experiment with different strategies. For example, in Simcity students can design a city, but if it is not supported by well-thought-out infrastructure, the citizens would leave and the city would decline. Positive side effects of computer simulation games included the increased use of library where computers were situated with the simulation game installed. The research found that most of the games in the study could be used to support the learning outcomes identified in advance by the teachers. The developed skills were IT skills, motivation, collaboration and thinking skills.

Simulations are often used not only in classrooms but for industrial training as well. They can help to understand the operation of a company better because workers can test various situations with them. *Crookall and Oxford* (1990) emphasise the use of simulation games to provide such richness in the learning phase which might be difficult to obtain by other training techniques and methods. Simulations encourage the 'aha-effect' when the behaviour of the simulation game or its results provide new insights. Several special industrial simulations are created based on the request of companies. There are companies who develop such simulations for request.

Comparison of three business simulation games

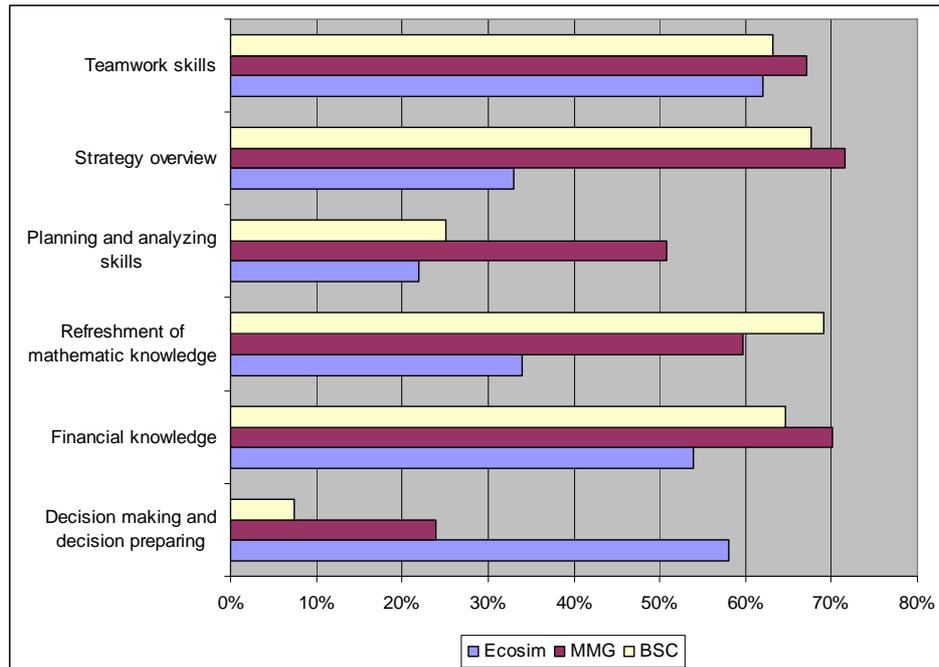
It is looking obvious to analyse which skills are developed by playing with simulation games. Since 2007 I have been regularly asking students who learn business simulation games at the University of Pécs, Faculty of Business and Economics about their experiences. I make the research in Hungarian and English language programmes as well. For the research I use a questionnaire, which is customized every semester, with the same questions. Hereby I publish some of my findings throughout this research process.

At the University of Pécs, Faculty of Business and Economics students play with two simulation games. One of the simulation games is called BSC (Business Simulation Game) which has been developed at the University of Pécs by Tibor Kiss. The other one is called MMG (Multinational Management Game - <http://www.microbuspub.com/mmg.htm>), developed by J. Bernard Keys and Robert A. Wells in the USA. Orova (2005) had a similar research, where some of the questions were the same, so results can be compared easily. Orova used a Post Simulation Game developed by Ecosim Kft, in this paper I call this 'Ecosim' simulation, however, it is important that there are several more different Ecosim simulations, which I do not analyse in this paper. The question was the following, answered by 67 students at the University of Pécs:

In your own opinion, which of your following skills were developed by the simulation game? (you can choose multiple answers)

- Refreshment of mathematic knowledge
- Planning and analyzing skills
- Strategy overview
- Financial knowledge
- Decision making and decision preparing
- Teamwork skills
- Other, please specify:

Figure 1. Positive effects of business simulation games



(Source: own research for MMG and BSC, Orova [2005] for Ecosim)

As Figure 1 shows simulations help to develop skills. It depends on the simulation which skills it develops more. All the simulations included in the research help the students to work in teams. Modelled companies in these simulations are always managed by a team of students, decisions are made by consensus. As a lot of mathematical calculations are needed for making the decisions, they help to refresh mathematic knowledge as well. Based on the transparency there are two types of simulations: black-box simulations and transparent-box simulations which are also called sometimes white-box simulations (Kiss, 2003). Transparent-box simulations provide structural information about the underlying model that can help to understand the working of the simulation model better for the players who can examine not only the results of their decisions in this case but also the causes (Gröbler, 1997). In the research transparent-box simulations are represented by BSC, black-box simulations are represented by MMG and Ecosim. In all simulation games there is a pressure to make decisions in time. Furthermore students have to make decisions in unpredictable situations as well, which makes them learn decision making and decision preparing skills. Ecosim is played for a whole day with several decision periods, so in this case the pressure on decision makers is much more than on a usual university lecture which happens once a week. BSC as a transparent-box simulation simplifies the process as it shows predications for the outcome of the decisions. BSC and MMG are both very good in developing strategic overview, which is one of their main purposes in education. This skill is developed by playing for lots of periods, in these games the number of periods are between 10-25 in one game. The long-time perspective allows students to plan for long-time, which causes the same effect as playing with Simcity (Kirriemuir & McFarlane, 2003). Less number of periods does not

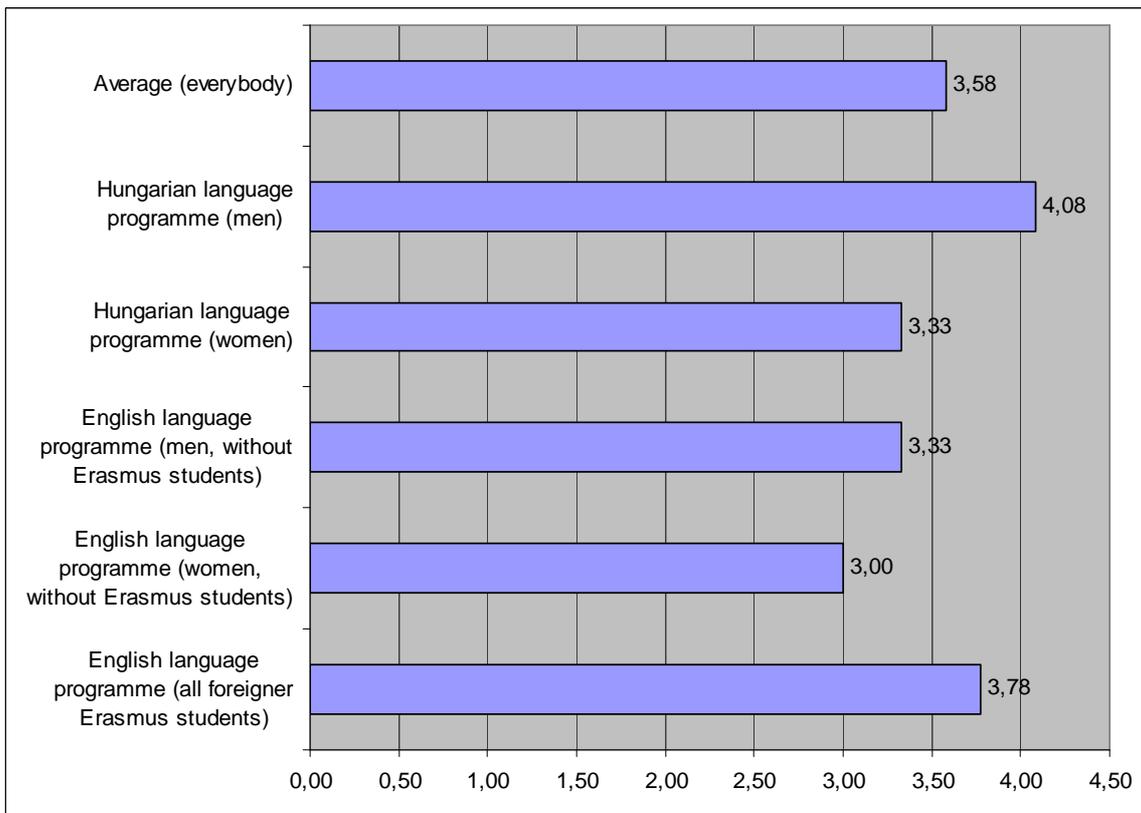
allow evolving a strategic overview; however these simulations can be still very useful for other purposes as discussed above.

To look beyond the positive effects it is worth examining how much simulations can contribute to make university lectures more practical than theoretical. 161 students answered the following question regarding the BSC simulation.

Could BSC game promote the better understanding of the relationship between functional areas?

(1) *Not at all* ← □ □ □ □ □ → *Definitely yes* (5)

Figure 2. Could BSC game promote the better understanding of the relationship between functional areas? (1 = not at all, 5 = definitely yes)



(Source: own research at University of Pécs, Faculty of Business and Economics)

The survey resulted in an average of 3.58 value, which means that BSC helps to understand the relationship between functional areas in a company. It is interesting to see which students of University of Pécs, Faculty of Business and Economics evaluate this aspect higher. There is a difference between men and women, men evaluate the positive aspect of BSC simulation higher. The simulation had a greater effect on Hungarian language programme students than English language programme students. This is possibly caused by the fact that the Middlesex University accredited English programme is much more practice orientated than the traditional Hungarian programme where there is more need for practical business simulations. It is important to know which simulations help the better

understanding of the working of a company. 68 students answered the following question.

How could the „Transparent box theory“ (you can see the exact operation of the system) promote the better understanding of the business and market processes? (Such elements are in the game: forecast details, and accounting details.)

(1) Not at all ← □ □ □ □ □ → Definitely yes (5)

The answers show an average of 3.46, which means that BSC as a transparent-box simulation helps the better understanding of the simulation model. There is no big difference in Hungarian and English language programmes in this question. On the other hand some students rather like the black-box model. Some students do not like to investigate the working of the simulation model and find it rather challenging to find out how it works. To collect more information I asked the students the following question.

Which one do you prefer? Black-box (you can't see the algorithm of the game, like in the case of MMG) or transparent-box (you can see how the software calculates everything, like while playing with BSC)?

Black-box (like MMG) ← □ □ □ □ □ → Transparent-box (like BSC)

Based on 65 answers the result shows high variation. The average is 3.12 which is nearly in the middle. Out of 65 people 27 people answered one end of the scale. 12 absolutely liked the black-box simulation and 15 people rather liked the transparent-box simulation. Others did not have so extreme answers. To conclude, transparent-box simulation is better for education but students are not so clearly prefer this type of simulation against black-box simulation.

Other important features of simulation games

When playing a business simulation game not only the simulation model is important, but other aspects as well. There are features which make business simulations better than others. One of these features is engagement. Simulations have to engage players to keep them motivated. One way to achieve this is to provide feedback. Usually when students are rewarded for completing a task they change their attitude and engage more in the game. Traditional video games continuously bombard users with challenges to solve. This maintains attention but not valuable for education because these games are in this way reactive. Users try to accomplish some challenges and the strategy is too tightly defined. For education purposes a game has to be proactive, which means that the player can make a wide variety of decisions and s/he receives feedback soon (Bos, 2001).

In usual business simulation games this means that the feedback is received in form of a report at the end of each period. The length of one period can vary between 10 minutes and one hour. My research is based on asking 62 students how much the optimal time is for a BSC decision period resulted that the optimal time for a period in case of BSC game is around 14 minutes. Dependent on task characteristics and difficulty this time can vary a lot, there is a time pressure which is optimal (Größler, 1999). Usually in black-box simulations students may need more time to be able to make a decision.

Another important aspect of simulation games is the design of them, called the user interface. In some simulations it is very simple, but in every case it should be clear and informative as it always serves the user. There is a need for easy handling. Good visibility enhances testability and contributes to group participation as well (Kreutzer, 1993).

Conclusions

Business simulations are useful to make education more practical. They enhance skills like strategic overview, planning, decision making and teamwork, also develop knowledge in finance and mathematic. As simulations are different they develop different skills. One way to categorize them is the visibility of the underlying mathematical model, which can be visible (transparent-box) or hidden (black-box). Transparent-box simulations help students to understand the working of a company better, but there is no agreement which simulation is rather liked by the students. There are more features which are important for a simulation, these include engagement, providing feedback and user interface.

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